

# PUBLIC HEALTH REPORTS

*In this issue*



U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Public Health Service



## **Occupational Health on Farms**



# PUBLIC HEALTH REPORTS

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## **frontispiece**

Toxic chemicals have joined the list of farming hazards, a new and complex field confronting industrial hygienists (see paper by Doyle, p. 145).

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U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

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# North American Blastomycosis in an Epidemic Area

By JEROME S. HARRIS, M.D., J. GRAHAM SMITH, JR., M.D., WALTER C. HUMBERT, M.D.,  
NORMAN F. CONANT, Ph.D., and DAVID T. SMITH, M.D.

AFTER 10 patients with North American blastomycosis, all from the same area in Pitt County, N. C., were admitted within a month and a half to Duke Hospital, we thought a survey for blastomycosis would be desirable.

Since the epidemic included a child as young as 7 years and a man aged 77 (1), plans were made to examine all persons within a 4-mile radius from the center of Grifton in Pitt County. About 750 were expected. Knowledge about the epidemic became so widespread and community interest so intense, however, that 1,648 people appeared. Many came from nearby areas. The survey was conducted during the week of April 12-16, 1954.

## Methods of Study

The survey included skin tests with *Blastomyces* vaccine, histoplasmin, and old tuberculin; complement fixation (CF) tests of blood specimens; and 70-mm. chest X-rays. Children

under 6 years were not X-rayed because of the technical difficulty in taking satisfactory pictures, but children in that age group were skin tested. When feasible, their blood samples were obtained also.

The *Blastomyces* vaccine and histoplasmin tests were placed on the right forearm at widely separated points. The tuberculin tests were made on the left forearm.

A 0.1 ml. portion of each of the 3 antigens was injected intracutaneously. In no instance were different antigens used in the same syringe. All syringes were new and were marked with a diamond point to indicate which antigen was to be used. After initial use each syringe was resterilized with other syringes used for the same antigen. The syringe was autoclaved before it was refilled.

The skin tests were read by measuring the diameter of areas of erythema and induration with a millimeter ruler. Skin tests were considered positive when induration was 5 mm. or more, or doubtful when erythema was 10 mm. or more and induration less than 5 mm. All other results were considered negative.

Because of the unanticipated response to the survey, it was necessary to use 3 lots of histoplasmin. Patients (group 1) numbered 1 to 650 were tested with lot HKC-5 diluted 1:500. Patients (group 2) numbered 651 to 1,200 were tested with lot H-42 diluted 1:100, and patients (group 3) numbered 1,201 to 1,648 were tested with lot H-42 also, but the histoplasmin was diluted 1:1,000.

Lot HKC-5 and lot H-42 of histoplasmin

*Three of the authors are associated with Duke University School of Medicine. Dr. Harris is chairman, department of pediatrics; Dr. D. T. Smith is chairman, department of microbiology; and Dr. Conant heads the mycology laboratory. At the time of the study Dr. J. G. Smith was an instructor in the division of dermatology and syphilology, department of medicine, Duke University School of Medicine. At present he is an instructor in the division of dermatology, University of Miami School of Medicine. Dr. Humbert is health officer of Pitt County (Greenville), N. C.*

**Table 1. Blastomycin and histoplasmin reactions in entire study population**

Blastomycin (mm. induration)	Histoplasmin (mm. induration)							Total
	0	1-4	5-9	10-14	15-19	20+	Unknown	
0.....	809	65	35	10	-----	1	65	985
1-4.....	224	167	10	14	6	1	16	438
5-9.....	18	3	5	3	2	-----	4	35
10-14.....	4	1	-----	-----	1	-----	-----	6
15-19.....	-----	-----	-----	-----	-----	-----	-----	-----
20+.....	-----	1	-----	-----	-----	-----	-----	1
Unknown.....	3	-----	-----	-----	-----	-----	180	183
Total.....	1,058	237	50	27	9	2	265	1,648

were supplied by Dr. Michael L. Furcolow, chief of the Kansas City Field Station of the Communicable Disease Center, Public Health Service.

Undiluted old tuberculin (Wyeth, Inc.) was supplied by Dr. William M. Peck of the North Carolina Sanatorium for Tuberculosis at McCain and was diluted 1:1,000 before use.

The *Blastomyces* vaccine was prepared in Dr. Conant's laboratory from 6-day yeast phase cultures grown in brain-heart infusion on blood-agar slants at 37° C. The yeast cells were then killed by suspension for 2 hours in a saline solution heated to a temperature of 56° C. The vaccine dilution, though not strictly an extract, will be referred to hereafter as blastomycin.

CF tests with *Blastomyces* antigen were performed by Dr. Joseph Schubert at the laboratories of the Communicable Disease Center, Public Health Service, Atlanta.

#### Results of Tests

Logistic difficulties made it impossible to test everyone with each antigen; therefore 1,465 persons were tested with blastomycin, 1,383 with histoplasmin, and 1,325 with tuberculin. Forty-two had positive reactions to blastomycin (2.9 percent), 88 to histoplasmin (6.4 percent), and 340 to tuberculin (25.6 percent.)

The fact that acquired histoplasmin sensitivity in some persons will give a cross reaction to blastomycin is well known (2, 3). On the other hand, the converse situation of a positive blastomycin skin test with a negative histoplasmin skin test has been observed not in-

frequently at Duke Hospital in patients with clinical blastomycosis though similar instances have been reported rarely in the literature (4, 5). Of the 1,380 persons tested with both histoplasmin and blastomycin in the survey, 11 had positive tests with both antigens and 27 had a blastomycin skin test of 5 mm. or more of induration and a histoplasmin test showing 4 mm. or less of induration (table 1). Despite the insignificant reactions to histoplasmin, in 6 of the 27 induration from the blastomycin was larger than 10 mm. Conversely, 77 individuals reacted to histoplasmin but not to blastomycin. Thirty-two of these had more than 10 mm. of induration with histoplasmin. The degree of cross sensitivity must, therefore, be small.

As previously noted, 3 histoplasmin antigens were used in the survey: HKC-5 diluted 1:500, H-42 diluted 1:100, and H-42 diluted 1:1,000 (tables 2, 3, and 4). Since H-42 1:100 and HKC-5 1:500 were considered to give analogous reactions, no comparison of the relative size of induration was made (6). The difference in size of reaction to H-42 1:100 and H-42 1:1,000 might be of considerable magnitude, however.

To test that possibility, 13 persons, most of whom were known to react positively to histoplasmin, were tested with 1:1,000 and 1:100 dilutions of lot H-42. The more concentrated solution was injected into the right forearm of 7 individuals and into the left forearm of 6. Both tests were negative in 3 of the 13 persons, but in 3 others induration measured less than 5 mm. with the 1:1,000 dilution and more than 5 mm. with the 1:100 dilution. The remaining



7 had positive reactions to both antigens, but in general the induration was several millimeters larger at the site of the 1:100 dilution.

Dependence of reactivity on the concentration of the dose was also evident in the 3 test groups. Eighty-eight, or 6.36 percent, of all 1,383 individuals tested with histoplasmin were positive. The percentage of positive reactions in group 1 was 6.69 ( $41 \div 613$ , table 2). The percentage in group 2 was 7.57 ( $29 \div 383$ , table 3) whereas in group 3 it was 4.65 ( $18 \div 387$ , table 4). The lower percentage of positive reaction in group 3 may have resulted from the more diluted antigen of histoplasmin.

Nevertheless, the variable of a more dilute antigen in the 387 tests in group 3 does not influence the preceding conclusions concerning cross reactions since only 8 of the 27 individuals with positive blastomycin and negative histoplasmin reactions were tested with the weaker strength of histoplasmin. Seven of the eight

had no reaction to the histoplasmin. Since all controls having a positive reaction to the more concentrated dose of histoplasmin also had some induration from the weaker material, it is doubtful that the 7 would have shown positive reactions to the 1:100 dilution. The individual who showed less than 4 millimeters of induration from the 1:1,000 dilution might have been definitely positive to histoplasmin if he had been injected with the 1:100 dilution. However, that possibility would not invalidate the general conclusion that individuals can be highly sensitive to blastomycin without demonstrating histoplasmin sensitivity. The frequency of the converse situation (histoplasmin sensitivity and blastomycin negativity) is obvious from the tables.

On the other hand, some degree of association between histoplasmin and blastomycin sensitivity in a population can be shown statistically from probability tables. For example, from

**Table 2. Blastomycin and histoplasmin reactions in group 1: histoplasmin lot HKC-5 diluted 1:500**

Blastomycin (mm. induration)	Histoplasmin (mm. induration)							Total
	0	1-4	5-9	10-14	15-19	20+	Unknown	
0.....	272	39	11	6	-----	1	-----	329
1-4.....	114	137	4	7	6	1	-----	269
5-9.....	6	2	3	1	-----	-----	-----	12
10-14.....	-----	1	-----	-----	1	-----	-----	2
15-19.....	-----	-----	-----	-----	-----	-----	-----	-----
20+.....	-----	1	-----	-----	-----	-----	-----	1
Unknown.....	-----	-----	-----	-----	-----	-----	32	32
Total.....	392	180	18	14	7	2	32	645

**Table 3. Blastomycin and histoplasmin reactions in group 2: histoplasmin lot H-42 diluted 1:100**

Blastomycin (mm. induration)	Histoplasmin (mm. induration)							Total
	0	1-4	5-9	10-14	15-19	20+	Unknown	
0.....	248	21	15	3	-----	-----	15	302
1-4.....	53	23	4	4	-----	-----	2	86
5-9.....	6	-----	-----	1	2	-----	1	10
10-14.....	3	-----	-----	-----	-----	-----	-----	3
15-19.....	-----	-----	-----	-----	-----	-----	-----	-----
20+.....	-----	-----	-----	-----	-----	-----	-----	-----
Unknown.....	-----	-----	-----	-----	-----	-----	42	42
Total.....	310	44	19	8	2	-----	60	443

table 5 it can be seen that considerably more persons reacted positively to both antigens than can be explained on a random basis from the number of reactors to each antigen separately. Eleven individuals reacted to both antigens whereas only 2.4 would have been expected in this group. The difference is highly significant statistically (chi square equals 30.0).

This association may be caused not only by a general hypersensitivity of the skin in these individuals or by a similarity in the antigenic components in the two test materials, but also by a common mode of spread of the diseases so that there would be a statistically significant increased probability of exposure to both diseases over the random chance of acquiring the two on independent bases. Of the 11 individuals who reacted to both blastomycin and histoplasmin, 7 had negative tuberculin tests, 3 had positive tuberculin tests, and 1 was not tested for tuberculosis. These figures are similar to those of the general population and do not indicate general hypersensitivity of the skin in these indi-

viduals. The failure of the blastomycin and histoplasmin tests to show cross reactivity in 104 individuals out of the 115 that were positive for either test (table 5) speaks against the presence of strong common antigens while recent reports of simultaneous infections with blastomycosis and histoplasmosis in humans and dogs is strong evidence for the last postulate of a common mode of transmission (7, 8).

The age variation in the percentage of reactors in the study of tuberculin, histoplasmin, and blastomycin is shown in the figure. The high prevalence and rapid increase of tuberculin sensitivity with age is well known for Pitt County. The graph shows a gradual and poorly defined increase in both histoplasmin and blastomycin reactivity with age. The poorly defined histoplasmin reactivity is in marked contrast to the conditions pertaining in the Mississippi Valley areas (9). The lack of correlation between the reactions of tuberculin and of histoplasmin or blastomycin sensitivity is well demonstrated by the chart.

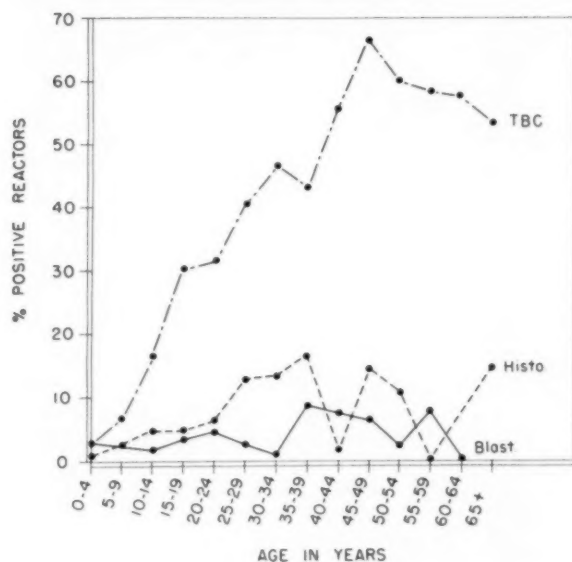
**Table 4. Blastomycin and histoplasmin reactions in group 3: histoplasmin lot H-42 diluted 1:1,000**

Blastomycin (mm. induration)	Histoplasmin (mm. induration)							Total
	0	1-4	5-9	10-14	15-19	20+	Unknown	
0.....	289	5	9	1			50	354
1-4.....	57	7	2	3			14	83
5-9.....	6	1	2	1			3	13
10-14.....	1							1
15-19.....								
20+.....								
Unknown.....							106	109
Total.....	356	13	13	5			173	560

**Table 5. Correlation between prevalence of blastomycin and histoplasmin sensitivity**

Blastomycin	Histoplasmin				
	Positive		Negative		Total
	Observed	Expected	Observed	Expected	
Positive.....	11	2.4	27	35.6	38
Negative.....	77	85.6	1,265	1,256.4	1,342
Total.....	88	88.0	1,292	1,292.0	1,380

**Variation with age in prevalence of positive skin reactions to tuberculin (TBC), histoplasmin (Histo.) and blastomycin (Blast.).**



Blastomycosis CF tests were performed on 1,275 serums of the 1,648 individuals in the survey. Twelve serums were anticomplementary, 1,220 were negative, and 43 were positive to the CF tests. The titers ranged from undiluted to 32-fold dilutions. The number of positive skin tests in each group showing different degrees of titer are presented in table 6. Complement fixation showed no obvious correlation with blastomycin or tuberculin skin sensitivity. However, although the percentage of positive tuber-

culin tests and of positive blastomycin tests in the group showing complement fixation is similar to the percentage in the general study population, the percentage of histoplasmin reactors is much greater in the former group (30.2 percent) than in the latter (6.4 percent). Further, the individuals having positive CF titers failed to show a much greater prevalence of positive blastomycin skin sensitivity than did the general population (table 6). The significance and meaning of these observations await clarification.

The survey included 1,465 (70 mm.) fluorophotographs; 1,393 (95.1 percent) were negative, 4 were unsatisfactory, and 68 showed some evidence of pathology involving either the heart or lungs. Forty-six large roentgenograms were taken of suspicious lung lesions. However, although many small scars were noted, only one individual was found to have active pulmonary tuberculosis. This result was most surprising in view of the high percentage of tuberculin reactors (25.6 percent) in the study population. Only 17 of the 72 individuals with suspicious fluorophotographs had positive tuberculin tests, 6 had positive histoplasmin tests, and 6 were positive to blastomycin. No instances of pulmonary blastomycosis or histoplasmosis were uncovered although a 31-year-old male who moved to Grifton one month (March 1954) before the survey developed cough and chest pain shortly thereafter. He did not attend the

**Table 6. Relationship between skin sensitivity and Blastomyces complement fixation test**

Complement fixation titer	Persons with positive reactions			Persons with negative skin tests	Persons without skin tests	Total
	Tuberculin	Histoplasmin	Blastomycin			
Undiluted	2	3		2		7
1:2	6	2		6		14
1:4		2		6	1	9
1:8	1	4	1	0	2	8
1:16	1	1	1	0	1	4
1:32		1		0		1
Total	10	13	2	14	4	43
Percent of total showing positive skin tests <sup>1</sup>	23.3	30.2	4.7			
Percent of total population showing positive skin tests	25.6	6.4	2.9			

<sup>1</sup> Percent of total showing positive blastomycin complement fixation who showed a positive skin sensitivity test.

survey because of his recent arrival. In July 1954 he was diagnosed at Duke Hospital as having blastomycosis.

### Summary

In an epidemic area in Pitt County, N. C., 1,648 individuals were surveyed for North American blastomycosis by Duke University School of Medicine. Blastomycin skin tests and complement fixation tests were made, and 70-mm. fluorophotographs were taken. Sensitivity to histoplasmin and tuberculin was determined simultaneously.

Of the population, 2.9 percent were sensitive to blastomycin, 6.4 percent were sensitive to histoplasmin, and 25.6 percent had positive reactions to tuberculin. The *Blastomyces* CF test did not correlate with skin sensitivity. No individuals with cutaneous or pulmonary blastomycosis were discovered, and only one individual with active pulmonary tuberculosis was found.

The correlation between blastomycin and histoplasmin sensitivity was carefully studied, but there was little evidence in this survey that antigens common to blastomycin and histoplasmin would explain completely the unexpectedly greater number (11) of individuals who were sensitive to both histoplasmin and blastomycin. The evidence may implicate a common mode of contact with the agents causing sensitivity to these two materials. There was no correlation

between sensitivity to tuberculin and sensitivity to either blastomycin or histoplasmin.

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## Dr. Charles-Edward Amory Winslow

February 4, 1877-January 8, 1957

Dr. C.-E. A. Winslow has made an immeasurable contribution; his genius and untiring efforts have placed an indelible mark on the entire world of public health. Many thousands of health workers, like myself, are forever indebted to his teaching, his guidance, and his wise counsel. To the generations that come after us, his wisdom will have an undying influence and stimulus. We have lost a great man whom we have loved, honored, and revered, and whose memory we will always cherish.

—Surgeon General Leroy E. Burney



# Central Technical Services of the World Health Organization

By **FREDERICK J. BRADY, M.D.**

SOME of the technical services of the World Health Organization, which are carried on primarily from the headquarters in Geneva, have importance to the whole world. These activities have come about as the result of over a hundred years of attempts at international cooperation in those health matters that must be undertaken by nations working in concert.

The first abortive activity took place in 1851, when representatives of 12 nations met together to find common solutions to limiting pestilential diseases that periodically swept through most of the world. Unfortunately, in those early days there was no tradition of international cooperation, and the views expressed by delegates regarding the need to cooperate on health matters were not upheld by their governments. This was the beginning of a series of international conferences that, with the growth of scientific knowledge, began to bear fruit after a half century.

In international negotiations each participant, to gain objectives, must be prepared to relinquish certain prerogatives. We are fortunate in that objectives in health are similar for

all nations and that there is a high degree of understanding of each others' problems. This fortunate position has borne fruit in the World Health Organization and has been of immeasurable benefit in protecting the health of the American people. At the same time, health authorities of the various countries have not had to make major compromises, owing to agreement on ends.

WHO programs are varied, evolving from the early negotiations among nations which were concerned almost exclusively with problems related to international quarantine.

## International Sanitary Regulations

At present the governments of 132 nations and territories have agreed to abide by the WHO International Sanitary Regulations that became effective in 1952. Twenty-four more governments are bound by these regulations with specific reservations that are published and known to the rest of the world. Eleven nations are not bound, and the position is uncertain in 12 others.

The International Sanitary Regulations are confined to six pestilential diseases, namely, smallpox, cholera, plague, yellow fever, typhus, and relapsing fever. The regulations were drafted not to impose on countries an unnecessary burden of measures to take against these diseases but rather to limit the measures nations could take in order to prevent the disruption of trade and travel while at the same time providing maximum security.

---

*Dr. Brady is assistant chief of the Division of International Health, Public Health Service. His speech, in essentially the same form, was delivered at the annual conference of the National Citizens' Committee for the World Health Organization, November 14, 1956. The conference met with other groups in Atlantic City, N. J., at the 84th annual meeting of the American Public Health Association.*

Until the regulations were adopted, 13 treaties and covenants dealing with quarantine were in effect. None was comprehensive in scope: Some were of a regional nature, and some applied solely to one disease or one type of transport. None was ratified by a sufficiently large number of countries. With the exception of the Pan American Sanitary Code, the regulations have replaced all previous treaties.

The International Sanitary Regulations are of great benefit to travelers from the United States because they give advance knowledge of what measures quarantine authorities in various countries may apply and also prevent overzealous authorities from taking unduly restrictive measures.

### **International Disease Reporting**

Related to work on quarantine are the epidemiological intelligence activities of the World Health Organization. WHO regularly receives notifications of cases of quarantinable diseases which it then analyzes and transmits to health administrations, by radio bulletins and in weekly reports, thus providing health authorities with up-to-date knowledge on the distribution of quarantinable diseases.

The reporting program has been extended to other important communicable diseases and even to the degenerative diseases, making it possible for WHO to publish analyses and reports on their prevalence throughout the world.

Soon after its organization, WHO established an international system to detect any unusual outbreak of influenza lest a pandemic such as that of 1917-18 reoccur. The highly competent virus laboratories of the world form a network for reporting any unusual prevalence or virulence of the influenza virus. It is hoped that with adequate notice, vaccines can be prepared from dangerous viruses to keep outbreaks from reaching epidemic or pandemic proportions.

With the degree of protection afforded by the Salk vaccine, the prevalence of various strains of poliomyelitis virus assumes a new importance. It is also important to know whether presently unknown strains of poliomyelitis virus exist in the world. To meet these problems, WHO is encouraging virus laboratories

to determine the strains of poliomyelitis virus endemic in their localities and to watch for previously unrecognized strains.

WHO, as the coordinating authority in international health, is unique in its ability to collect, analyze, and compare health data from various parts of the world. The Organization presently is studying a proposal to organize registries of pathological tissues into a worldwide network, thus permitting interchange of specimens and diagnoses for comparative purposes.

Our knowledge of pathology is based almost entirely on specimens from Europe and North America. In the past we have generalized from these materials, assuming that our knowledge has universal application. In several diseases thought to be the same throughout the world, detailed descriptions of pathology lead to speculation whether the diseases observed are the same or whether similar but different diseases exist.

At this time it is not known in what area the World Health Organization will make a modest beginning in these activities, but one would expect that any disease chosen for study would have an unexplained, bizarre distribution pattern. One could foresee in this proposal an opportunity to further knowledge of pathological processes and also to provide unique opportunities for training.

### **International Drug Programs**

International cooperation in dealing with drugs and other therapeutic substances has become a necessity. WHO activities relate particularly to the recommendation of standards for establishing common names and determining the purity and potency of drugs moving in international commerce.

Because some therapeutic substances of great importance in medicine today cannot be tested for purity and potency by physical and chemical methods, their analyses must be based on biological procedures. Unfortunately, biological standardization does not lend itself to the niceties of chemical or physical determinations but must take into account the variations in the response of living organisms used in tests.

Standard or reference samples become of great importance.

With the assistance of experts and cooperating laboratories from all over the world, WHO has so far established 66 biological standards for vaccines, serums, hormones, antibiotics, and enzymes. Standardization has resulted in providing international units that assure physicians the world over of the dosages they are prescribing.

Sometimes we are inclined to overlook the importance of national pharmacopoeias. Prescriptions for drugs were issued in ancient Egypt as long ago as 2800 B.C. Pharmacopoeias began to appear in Europe in the 16th century. The United States has had an officially recognized pharmacopoeia since 1893, serving as the basis for the purity and potency of our drugs.

Today, with the spreading use of modern drugs, at least 40 nations have official pharmacopoeias, which they revise from time to time, and other countries are preparing pharmacopoeias or specifications. There is a resulting urgency to achieve greater uniformity of standards so that the drugs will have comparable composition and potency no matter where they are produced.

While this problem has been a matter of concern to pharmacopoeial authorities for many decades, it was only after the World Health Organization came into existence that an international pharmacopoeia was completed. The International Pharmacopoeia is a model for governments to use in drafting their own pharmacopoeias.

It is noteworthy that the chairman of the United States Pharmacopoeia Committee was active in developing the International Pharmacopoeia and that the second volume was widely circulated before publication to pharmacologists and drug firms in the United States. Reports from various sources indicate that pharmacopoeial committees in different countries are being guided by the specifications recommended in the International Pharmacopoeia.

A related problem is that of advising governments on acceptable names of drugs of international importance, names that nations are willing to protect against trademark rights.

Examples have come to light where a trade-

mark has been issued to a vested interest for a name in such common use as penicillin or cortisone. Royalties, of course, are then paid to the owner of the trademark by the manufacturer and importer of the drug even though the owner did not contribute to its preparation or importation.

To prevent such vicious practice, WHO, on the advice of experts, recommends a name for a drug to each country, asking that the country examine its trademark files to be sure that the name has not been preempted. If no objection is received within 4 months, WHO recommends that the name be protected against trademark rights throughout the world.

More than 200 nonproprietary names have been recommended by the World Health Organization and accepted by the governments as the official names of these drugs. This is no little accomplishment when it is realized that such names should be readily pronounceable in three languages and should not have been preempted by another product already trademarked in any of 80 countries. This activity has been a boon to manufacturers and consumers as well as to the prescribing physicians and research scientists who can specifically identify a drug whatever its origin or labeling.

WHO also has a role in the worldwide control of addiction-producing drugs. The United Nations, by virtue of international conventions, brings illicit traffic in addiction-producing drugs under international control. On behalf of the UN, the World Health Organization determines which drugs are addiction producing and therefore subject to control. To make such determinations, the organization is aided by experts, who in turn seek advice from research laboratories.

### Vaccine Field Programs

Another major area in the central technical services of the World Health Organization is stimulation of research activities which, by their very nature, must be carried on by cooperation among countries.

An example is research on the effectiveness of typhoid vaccines prepared by each of several methods. The value of these vaccines became of concern to several Western countries when ty-

phoid fever appeared in individuals who, as a result of recent vaccinations, presumably were immune.

WHO selected a country with a high typhoid attack rate and assisted the country in setting up well-controlled experiments to ascertain not only the value of vaccine but also the effectiveness of several vaccines tested.

Similarly, WHO demonstrated the effectiveness of hyperimmune serum against human rabies and the effectiveness of canine vaccine in countries where the occurrence of rabies was sufficient to make valid comparisons. Both the hyperimmune serum and the vaccine were developed in the United States, but definitive tests could not be carried out because of relatively low attack rates.

In this discussion, I have tried to bring out some of the activities of the World Health Organization that cannot be carried out by single nations but that require collaborative effort among many. Each activity substantially benefits the United States even though the results are not as readily apparent or as tangible as those of a field program aimed at the control or eradication of disease. These are the activities in which there must be collaboration by many governments. We are indeed fortunate that this collaboration can be carried on through this effective international agency, the World Health Organization, in an atmosphere of understanding of the problems of each and of looking toward common goals.

### **Advisory Committee on Nurse Traineeships**

Twelve leaders in nursing, hospital administration, and medicine will serve on the Expert Advisory Committee for the Professional Nurse Traineeship Program.

The committee will advise the Public Health Service on the new 3-year program which provides funds to enable graduate nurses to get advanced training in supervision, administration, and teaching.

Committee members are: Dr. Robert Berenson, vice president in charge of medical affairs, University of Alabama, Birmingham; Lawrence J. Bradley, director, Genessee Hospital, Rochester, N. Y.; Miss Ann Burns, chief, division of nursing, Ohio State Health Department, Columbus; Rev. John J. Flanagan, executive director, Catholic Hospital Association, St. Louis, Mo.; Miss Ada Fort, dean, School of Nursing, Emory University, Atlanta, Ga.;

Miss Frances Frazier, in charge of graduate program in public health nursing, Teachers College, Columbia University, New York City; Mrs. Lulu W. Hassenplug, dean, School of Nursing, University of California, Los Angeles; Miss Katherine Hoffman, assistant dean, School of Nursing, University of Washington, Seattle; Miss Helen Nahm, director, department of baccalaureate and higher degree programs, National League for Nursing, New York City; Miss Agnes Ohlson, president, American Nurses' Association, and chief nursing examiner, State Examining Board, Hartford, Conn.; Miss Marguerite Paetznick, director, nursing service, Denver General Hospital, Colorado; Mrs. Margaret Filson Sheahan, director, nursing service, University of Chicago Clinics, Illinois.



# Residence Laws

The many social, economic, and psychological aspects of today's State residence laws were considered at three sessions of the 83d annual forum of the National Conference of Social Work in St. Louis, May 19-25, 1956.

The following résumé of significant points in the papers on residence laws was prepared by the Tuberculosis Program of the Public Health Service.

The full papers have been published in a symposium entitled "Residence Laws: Road Block to Human Welfare" by the National Travelers Aid Association, New York City.

In the symposium, Laurin Hyde, general director of the National Travelers Aid Association, who organized and presided over the sessions, gives a brief history of residence laws. He also presents the "Statement of Principles on Residence Laws," which was adopted on March 23, 1956, by the association, leader in the current effort to amend the laws.

## A Fluid Labor Force and Our Expanding Economy

Mobility has been, and perhaps will remain, the most dramatic example of what men can do if they are free to seek their own destiny in their own way, according to Robert C. Goodwin, director, Bureau of Employment Security, Department of Labor.

Except during the depression of the 1930's, each decennial census since 1890 shows that progressively larger percentages of the total population of the United States have moved from the States in which they were born. Experience during the war period proved that free people will respond to intelligent guidance.

"Free people are not moved, they move," he said. They move in response to very specific stimuli, more often than not economic, which apply to them as individuals.

Goodwin referred to the Wagner-Peyser Act of 1933, which established the present United States Employment Service and gave national recognition to the need for intelligent guidance of labor mobility. This legislation, he said, along with the Federal-State system of unemployment insurance, provided the first effective nationwide tools at the Government's disposal for improving the functioning of the labor market.

As to the future, Goodwin said that all signs point to continued mobility of our labor force. Huge metropolitan areas are increasingly

plagued by a transportation glut discouraging further industrial expansion. Huge concentrations are more vulnerable to enemy attack. Changing management concepts see greater efficiency in decentralized operations.

New means of communication make these concepts practical, he said. In addition, the development of economical power from nuclear energy may make industry possible in rural areas where it is now impossible. All this, he feels, adds up to a foreseeable greater need for the increased or at least maintained movement of people, but it may be a much more selective process than it is today.

Goodwin concluded with a challenge to those who deal with men in their social relations to see to it that they have the freedom to move without needless restraints, and that society provides them with the help they need in making the social adjustments accompanying their search.

## Human Values and Personal Problems of Movement

The motives for migration, why persons and families make a change of residence, were examined by Elsie M. Rogers, executive secretary, Travelers Aid Society of Long Beach, Calif.

The complexity and variety of reasons she presented all have in common what she termed "a basic urge for security." Problems sometimes resulting from mobility are equally complex and varied, ranging from those affecting the individual to those affecting whole social groups of society. Extensive and intensive publicity about the availability of well-paid technical jobs in this or that industrial area has wide appeal. Then, the skilled technician has a buyer's market if he isn't too set on working in a specific area, but there is often no way of knowing ahead of arrival whether there is need for his skills.

Industry assumes little or no responsibility in situations where the employee's funds are exhausted before he draws his first pay. Illnesses may develop suddenly. Hostile attitudes toward newcomers or cultural groups may be encountered locally. In the agricultural field,

even though the migrant farm worker is essential to our economy if our crops are to be harvested and our people fed, legal rights depend on where one lives rather than where one works, and the migrant farmer has almost no legal rights.

The strange vagaries of our residence laws also affect the serviceman and his family who since 1940 have been moving between military posts. Though they may have been based and have lived in a given community for 1 to 6 years, they have no rights to certain benefits in that community because they do not meet State residence requirements. Another phenomenon of our new industrial age is the "company man" and his family who contribute substantially to the statistics on moving persons.

Yet, in comparison with the enormous annual migration of workers in the United States, Rogers reminded, the number who encounter problems with which they need agency help is very small. She concluded that the penalty for unawareness of these social problems arising out of our changing way of life rests with all of us. Awareness is, she said, the responsibility, and the opportunity, we have for pioneering a path toward the solution of such problems so that those who meet the challenge of a mobile labor force are not penalized.

## What Happens in a State Without Residence Requirements

Peter Kasius took issue with what he termed "existing conflict in our own culture regarding the treatment of strangers"—the deep-seated disposition to extend a helping hand accompanied by a fear that helpfulness expressed in public policy may invite abuses.

Viewed in economic terms, according to the deputy commissioner for New York City affairs, New York State Department of Social Welfare, residence laws interfere with the free flow of labor and serve as a deterrent to adventure and risk-taking. Viewed in legal terms, they are in fact, if not in theory, a denial of the right of freedom of movement. Considered in social terms, they work unnecessary and often cruel hardships on people whose only fault is a willingness to take a chance.

Kasius said the time is propitious for each State to examine its own practices, to take careful note of the changing character of assistance programs, and to observe the effect of outmoded residence laws upon economic and industrial activity.

He presented certain features of this problem as seen in the experiences of one State, and particularly one city, which has had a long and troublesome history in dealing with the issue. This is the city and State of New York, and it is in New York City, as would be expected, that the greatest concentration of non-residence cases are found. Approximately 80 percent of that State's charge load is found in New York City, as compared with a 65 to 35 ratio for the total public assistance loads as between the city and upstate. But, even this disproportion should not be surprising, he said, when we consider that 13 million people move in and out of the metropolis each year. What is really amazing, he stated, is that the casualty list, as measured by relief figures, is so small.

Kasius concluded that State residence laws are reminiscent of the day when there was precious little difference between the treatment of a pauper and a criminal. He said "it is high time that we got rid of them."

## The Cost to Children of Restrictive Residence Laws

The plight of children in a situation created and made worse for individuals and families by restrictive residence laws, the children who are part of the mobile family group and the children who are left behind when their parents move to another city, was described by Edna Hughes, field consultant, Child Welfare League of America.

Some intrastate laws have one residence requirement for foster home care, another for certain kinds of institutional care, and still another for medical care, with a place for State payments to fill in the gaps. Under the law and policy of one State, she said, a survey of 10 counties found 159 children who either had to be removed from foster care because their parents had lost State or county residence or their

guarantee of financial support had to be removed.

Hughes presented some common convictions about the operations of restrictive residence practices affecting children:

- Every child should be enabled to live with his own parents or a relative when they can provide a suitable home.

- Financial assistance and service to enable a child's family to nurture him should not be denied by reason of governmental boundary lines, State or local.

- Every child without parents, or whose parents cannot provide a full measure of love, care, and supervision, should receive the protection of a social agency, voluntary or governmental, without regard to the State, county, or township origins of his parents.

- A child should be returned to his parents, relatives, or the community from which he came only on the basis of a social study and a social plan which attempts to obtain for him a home and family ties.

- Respect for personality and belief in the brotherhood of man mandates us to make resources available on an equitable basis to families and children wherever they may be whenever help is needed.

In concluding she invited consideration of what the family or children's agency, public or private, can do toward solving the residence problem as it affects children. She proposed three fronts on any one or all of which she feels the challenge may be met. It is believed, she stated, that social work knowledge, skills, and experience offer to social workers and social agencies their best resources for developing methods that will be effective with this particular problem, whether it is attacked at the case, the policy, or the legislative level.

## Impediment to Psychiatric and Mental Health Services

Dr. V. Terrell Davis, director of mental health, New Jersey Department of Institutions and Agencies, presented data which he feels show how restrictive residence requirements not only hamper psychiatric and mental health services, but also hamper and impede economic



progress and development of the community. He approached the question by discussing what he feels are essential features in any program for psychiatric and mental health services and by considering how these features might be restricted by residence requirements.

Davis pointed out some definite, bright signs of progress in dealing with underlying factors which may be contributing to "the symptom of restrictive residence requirements." These signs include the Interstate Mental Health Compact and an extension of Blue Cross hospital insurance coverage to include short treatment in psychiatric units of general hospitals in some areas of the country. There is also a gradual and continuing change in basic concepts of hospital admission and commitment procedures in the case of the mentally ill, with greater emphasis on procedures for voluntary admissions. Expenditures for mental health services are increasingly recognized as investments in human productivity rather than as money grudgingly spent for the care of incurables. And there is increasing legislative, community, and administrative support of the policy of treating emotionally disturbed individuals wherever they are found with the most effective and appropriate procedures available, and resolving separately the question of who is to pay.

In concluding, Davis said he believes we have definite indication that these trends, which seem to be present, may be expected to continue and develop. He said there is a growing feeling of mutual trust and respect between the professional and administrative personnel of various State and community groups. As a result, he said, these personnel have less concern about the possibility of having mentally ill patients who are nonresidents "dumped on" their facilities and resources.

## Let's Face Up to Restrictive Residence Laws

"There is surely no more embarrassing anachronism in our present social structure than the body of law and practice that denies public benefits to persons whose sole disqualification is their lack of a specified period of residence in the State, county, or locality in

which they happen to find themselves," Elizabeth Wickenden, consultant and writer on public welfare, asserted.

To lend color and force to her remarks, Wickenden presented an imaginary interview between an American social worker and a visitor from Mars.

The social worker tries to explain the existing social arrangements for assisting individuals overwhelmed by economic want or other personal disaster. However, each question from the imaginary Martian places the social worker deeper and deeper into the web of legalistic barriers that close forever the doors of assistance to those not possessing the open sesame to all our social provisions: the right of legal residence. The visitor expresses great surprise at finding what he terms "village psychology" so hardy in 1956 America, especially, he says, in view of our strong nationwide economy and present role of world leadership. He says further "... it does appear that if you earthbound social workers really believe what you say about the rights of individuals, the dignity of man, the universality of social responsibility and the ability of democratic countries to shape their own social institutions to the needs of their people, you should be able to find some way to wipe out these pockets of second-class citizenship that cause you such embarrassment."

## Medical Services Hampered by Restrictive Residence Requirements

The possibilities that may ensue when a tuberculosis patient is refused treatment were presented by Ruth B. Taylor, chief medical social consultant, Tuberculosis Program, Public Health Service.

The economic losses in any of these eventualities are unquestionably greater than the cost of hospitalizing the individual upon discovery of the disease, she pointed out. To some extent, however, she said, nonresidents with tuberculosis fare better than other nonresidents because the communicability of the disease is a strong factor in encouraging liberal policies. Relaxation of restrictions against these patients is, she stated, undoubtedly the result of



arduous effort on the part of public health officials. Although there is much variation throughout the country, several States have abolished (or never had) legal residence requirements for tuberculosis care, and others have ignored residence restrictions when unable to effect changes in them.

Taylor discussed a series of studies being conducted by the Tuberculosis Program, Public Health Service. These studies are designed to determine answers to specific questions about medical problems of nonresidents since data on this subject are largely nonexistent. During the 3-year interim between the first and last studies, isoniazid was introduced, and the pressures for beds have lessened in some communities. For these and other reasons, comparability and representativeness of the data cannot be claimed. However, she said, material emerging from these studies has contributed to a clarification of the nonresident problem, and current efforts are designed to determine how generally applicable the findings are to other States.

She summarized 10 major findings of the study in 22 communities in the north, southeast, midwest, and far western sections of the United States. Although these limited data allow one to draw only tentative conclusions, they have a commanding significance.

It was found that newcomers to communities do not appear to contribute disproportionately to the tuberculosis problem and nonresidents are a relatively small segment of the tuberculous population. Tuberculous nonresidents were fairly representative of the total

tuberculosis patients. They had a somewhat similar age, race, and sex distribution and had no unusual social characteristics. But they form, more or less, a cross section of the various social and economic strata. No evidence was found to support the assumption that liberalization of policies and availability of resources produced an influx of people desiring to take unfair advantage of this liberality. States from which nonresident patients migrated were widely scattered geographically. A number of other countries also were represented.

With some exceptions, citizenship did not prove to be as significant a factor in determining eligibility for tuberculosis care as residence. The overwhelming majority of nonresident patients had no established legal residence. Health officials were fairly consistent in their desire to provide needed medical services to tuberculosis patients regardless of legal residence. Sanatorium directors, welfare officials, and other investigating agents (including some professionally trained social workers) were more diverse in their reactions and frequently resisted any liberalization. The majority of the patients were hospitalized initially, but differences in philosophies were revealed in subsequent disposition.

Taylor feels the many variations in attitudes and policies toward persons with problems who do not "belong," reflect a need for an integrated and intensive program of interpretation, especially between health and welfare agencies which are presently often working at cross purposes.

## Proceedings Against Four Coal-Tar Colors

A ban on four coal-tar colors used in foods is sought in proceedings begun by the Food and Drug Administration in January 1957. The colors FD&C Yellow Nos. 1-4 are involved. Nos. 3 and 4 are used extensively in coloring butter and oleomargarine.

Animal studies show that large intakes of these colors could cause injury, although no instances of harmful effects on humans have been reported. The law requires that an approved coal-tar color must be harmless regardless of the amount consumed.

## The Prepayment Challenge

By W. PALMER DEARING, M.D.

**B**EFORE BEGINNING a discussion of the prepayment challenge from the viewpoint of a Government official, it may be well to recall that in the United States all of us are the Government. Any presentation of a Government view, therefore, must undertake to reflect the composite view of all of society, the professions, the consumers, the farmers, the businessmen, and so on. The authoritative interpretation of this view is made by Congress, which finally sets the policies, provides the funds, and reviews the performance of those of us who serve the public.

First, I propose to offer a few comments concerning the current status of health insurance and some of our hopes for the future. Then I will review some of the current Government programs which will affect and, we hope, stimulate the growth and improvement of health insurance.

I think it particularly appropriate to point out that voluntary health insurance has both fiscal and health aspects. Insofar as insurance encourages our citizens to seek medical care early, without financial deterrent, and eliminates worry over medical bills by the sick individual, its fiscal aspect contributes to health improvement. The health aspect, however, needs specific attention if the potential contributions of health insurance to health maintenance and restoration are to be fully realized. This means attention to the type, quality, and efficiency of the health services which are available through insurance. Encouragement of

comprehensive care, with proper emphasis on preventive services, and organization of service so that skilled specialty service is available when needed, but without waste, are examples of the health, as distinguished from the fiscal, aspect of insurance.

### Characteristics of Prepayment Plans

Turning now to medical service plans in operation, let us note and comment on several aspects as follows:

- Insurance for care of short-term illnesses rather than for major medical expense.
- Simplicity of administration.
- Nursing and convalescent services.
- Preventive services.

First, the benefit structure of present prepayment plans is designed primarily to provide protection against the cost of short-term hospitalized illness, the most frequent cause of unpredictable medical bills.

We need now to break down the problem of medical care costs further, to look at the components of the medical bill, particularly those which involve heavy financial burdens. Urban families, for example, on the average spend only 2 cents of their medical dollar for nursing services in the home or hospital, exclusive of nursing furnished as part of hospitalization. Urban families with large medical bills of \$1,000 or more, however, spent, in 1950, 14 cents of their medical dollar for nursing services. Even these averages obscure wide individual variations. Some families spend 66 cents or more of each medical dollar for nursing services. Medical care costs to the individual differ, depending on the nature of the illness, family circumstances, entitlement to care under industrial and

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*Dr. Dearing is Deputy Surgeon General of the Public Health Service. His paper was one of a series on prepayment delivered at the Western Conference of Prepaid Medical Service Plans, Sun Valley, Idaho, October 12, 1956.*

public programs, and other factors. The items which make up the less usual, but frequently catastrophic, medical bill need to be reexamined with a view to providing benefits more nearly in line with medical needs and services.

Despite the brief period in which major medical expense insurance has been offered, more than 5 million people now carry this type of coverage (1). Another step toward more complete protection is the extended benefits proposed by Blue Cross-Blue Shield plans. Some of these plans have experimented with limited coverage of care in convalescent homes and chronic illness hospitals, of the cost of expensive drugs and of special duty nursing. A start has been made by prepayment plans toward coverage of dental services. Progress along all these lines is essential.

To meet the needs of the buying public, we also must have an administrative base for broader health insurance offerings. Physician and hospital service plans, for example, have developed methods for joint administration of enrollments and claims. Coverage of nursing home and convalescent care has been worked out within the administrative organization of some Blue Cross plans. If it were possible to extend hospital services to provide special nursing and other auxiliary services in the home as well as in the hospital, we would have a practical base for insuring the costs of these services. This kind of arrangement would not only relieve the hospital of many nonacute long-term patients, it would also be a most valuable aid to the family physician and would reduce the costs of care.

A few hospitals now offer organized home care services. To a considerable extent, these services now are especially adapted to the needs of the indigent patient. A program similar to the home care offered by hospitals, though not necessarily as elaborate, could assist the family physician to care for his patients at home and help include these services in voluntary prepayment arrangements.

Another challenge to voluntary health insurance is the development of preventive health services. This is sound insurance practice as well as beneficial for the health of the subscribers. Well over 150 plans now offer insurance for a wide range of physician services in-

cluding diagnostic and preventive health services (2). These plans, like the Health Insurance Plan of Greater New York and the Permanente and Ross-Loos groups on the west coast, have proved it is feasible and practical to encourage the use of preventive service by insurance. Some of these plans carry on organized health education activities among their membership. Early detection and diagnosis of disease help to ease the burden of heavy medical care bills. Inclusion of diagnostic laboratory and X-ray services helps to encourage prompt attention to illness and early treatment.

Insurance carriers and the personnel who provide health services share with public health agencies the responsibility for preventive health activities. They also desire the development of health facilities and resources and their effective use for improving patient care. Some prepaid medical care plans now use the immunization, laboratory, and other services of public health departments, but many are not even aware of them. And there is also joint responsibility for health education of the public and for the development of new public health measures. We look to prepaid medical care plans for assistance in improving public health services so that they may better meet their own needs as well as those of the public generally.

### **Stimulating Voluntary Insurance**

Now, let us turn to some of the things the Government is doing which will affect and help extend and improve voluntary medical service insurance.

One of the major health goals of the Administration is to help encourage and strengthen voluntary health insurance. Accordingly, the Administration has urged legislation which would authorize Federal reinsurance to stimulate improved coverage and expanded protection for more people. It has also sought legislation to permit small insurance carriers to pool or share their risks in developing better protection.

The Federal Government has acted in another respect to stimulate the development of sound voluntary health insurance. People have suffered from misleading advertisements, cancellation clauses buried in policies, special



riders providing for various types of exclusions, and limitations that policyholders did not understand when they paid their premiums. Action has been taken by the Federal Trade Commission during the past 2 years to correct misleading advertising. Under this stimulus, insurance companies are examining the fine print in their contracts and improving their practices from the viewpoint of the consumer.

In addition to these roles of stimulation and regulation, the Federal Government has embarked on other programs designed to improve medical services for the American people. Among these are medical research, aid to States and communities in the construction of health facilities, fellowship and training programs to relieve shortages of professional manpower, and factfinding and analysis relating to health problems, needs, and resources. In addition, the Government is working with hospital, nursing, and other groups to explore methods of reducing the costs of care. And finally, the Government is developing new methods of providing coverage for special groups such as members of the armed forces and their dependents and Federal civilian employees.

Several of the programs mentioned are new or have been recently expanded. Congressional appropriations for medical research funds were increased markedly in 1956. About half of the total national budget for medical research is financed by Federal funds, mostly distributed as grants to universities, medical schools, hospitals, and other nongovernment research institutions.

Medical research has already paid enormous dividends in reduced costs of institutional care. The savings that have accrued as a result of the discovery of antibiotics, for example, can hardly be estimated. Although it was only a short time ago, relatively few remember the exorbitant costs of care for chronic osteomyelitis, or for chronic bladder infection, or for the parietic patient. On every hand, research has paid dividends far beyond its cost.

At the same time, application of research results changes the pattern and the cost of the service which voluntary insurance undertakes to provide. Early ambulation and better control of infection shorten the period of treatment but increase the per diem cost of hospital

care as compared with the days of long convalescence with little need for expensive procedures and drugs.

The local-State-Federal program of hospital construction was broadened 2 years ago to include Federal aid in the building of chronic disease hospitals, nursing homes, diagnostic and treatment centers, and rehabilitation facilities. This program encourages flexibility in community health planning and more efficient use of manpower and resources. At the request of the Administration, this program was extended in 1956 for an additional 2 years.

Congress, also in 1956, enacted legislation to provide financial aid for the construction of medical research facilities. The Administration's recommendation for aid in the construction of medical training facilities, however, was not enacted. The Secretary of Health, Education, and Welfare has stated that the Administration will continue to press for legislation to authorize grants for teaching facilities so that the supply of badly needed research scientists and physicians may be increased.

Congress, at the recommendation of the Administration, in 1956, also authorized a program of traineeships for professional public health workers and for graduate nurses, to help prepare more nurses for supervisory and teaching positions. This legislation, in addition, authorized grants to the States for the extension of practical nurse training. The funds appropriated for the National Institutes of Health of the Public Health Service furthermore will permit a substantial expansion of fellowships and traineeships to promising young research scientists and physicians throughout the country.

#### **Better Use of Facilities**

In working toward reducing the practical barriers to medical services we need to look toward a more rational utilization of facilities and personnel, with patients cared for in the facilities appropriate to their illness. Wider use of home care, outpatient facilities, and nursing homes offers great promise, both as a method of improving the use of health manpower and facilities and of reducing the cost of care. We also need to study such innovations as the



"minimal care unit," the "hospital hotel," and the "day hospital" for the care of patients during that portion of the 24 hours when families are unable to provide care.

The Department of Health, Education, and Welfare, in September 1956, initiated a cooperative study of various types of hospital units to develop recommendations on the organization of facilities more closely related to the specific needs of patients. To assist in this task, the Secretary has appointed an advisory committee composed of physicians, hospital administrators, and nurses. Dr. Russell Nelson of Johns Hopkins University is chairman. The primary objective of the committee is to help hospitals improve care and reduce costs, particularly for patients who need only limited services. The committee, in addition, may wish to consider the problem of extension of extramural hospital services as a base for insurance against the costs of special nursing and other auxiliary health services in the home.

There are longstanding programs for complete care of personnel of the uniformed services and medical benefits for civilian employees injured at work. Care has also been provided for dependents of uniformed personnel but only to the extent that facilities of the particular service are available. Modern industrial health care for civilian employees, however, is provided only on a limited basis. The Administration's proposals for a voluntary health insurance plan for Federal employees, participated in by the Government as an employer, have not been enacted into law.

The most significant action in the field of health care for Government employees is the dependent care law, which will make full use of the Government's plant by opening hospitals and outpatient clinics of any uniformed service to dependents of any other. It will also remove discrimination against the estimated 800,000 dependents to whom suitable service facilities are not available by authorizing payment for hospitalization and medical care for hospitalized illness of dependents by nongovernment physicians in nongovernment hospitals.

Since 1950, the Federal Government has participated in the financing of direct vendor payments for medical care of recipients of assistance under the Federal-State welfare pro-

grams. A new program enacted in 1956 authorizes a special earmarked grant for medical care for these recipients. The program will facilitate more adequate payments to hospitals, physicians, and other personnel for services to the indigent and thus have an impact on health insurance financing.

### Health Status Survey

Finally, the Federal Government has an important role in collecting information on the extent of sickness and disability and of the use of health services. These are the facts with which voluntary health insurance plans must work in expanding and extending protection. The 84th Congress provided for a continuing national survey of sickness and disability to provide comprehensive information on national health problems. In carrying out this program, it is essential that the needs of prepaid medical care plans be taken into account. The active cooperation of voluntary plans will improve the usefulness and value of the survey. Advisory committees now being set up will assure that the data will be of maximum benefit to various groups.

The national survey will yield current information on the health status of the general population. For factual data on the special groups covered under individual health insurance plans, more information should be obtained by the prepayment plans. Much of the information now gathered is not brought together. Much of what is compiled is not comparable from plan to plan. These specific data would be helpful in planning broadened coverage and in reviewing administrative organization.

Consideration should be given to an expanded research program on the economics of medical care. Establishment by the Blue Cross-Blue Shield plans of a clearinghouse for information about utilization and costs would stimulate greater uniformity in data collection and would be an important step toward improving our knowledge of the problems to be solved.

Great progress has been made and is in prospect to improve prepaid medical care and to help more American families budget against the costs of care. All of us have a stake in this job. All of us are faced with the challenge.

It will take the combined efforts of the health professions, of insurance plans, of industry and labor, and of Government to carry us closer to the goals.

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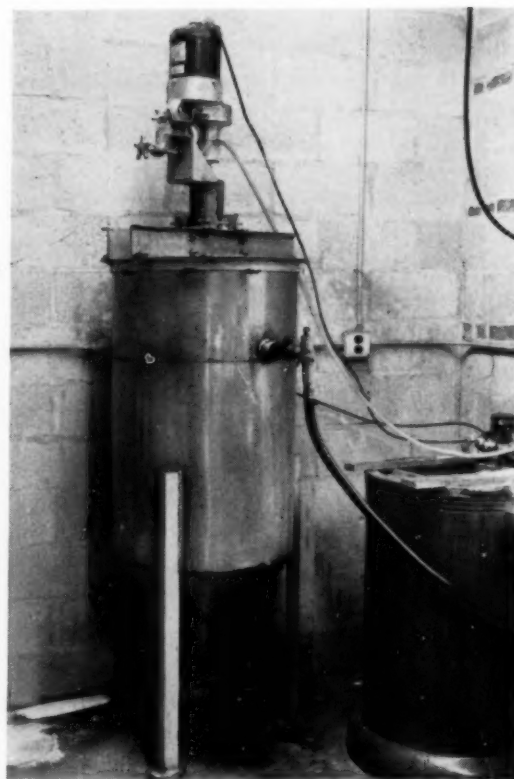
### Invention Reduces Fluoridation Cost

A device which will lower the cost of adding fluoride to city water supplies has been developed by two Public Health Service scientists.

The new dissolver makes it possible to use fluorspar, the most inexpensive form of fluoride, which is used in preventing tooth decay. The cost per pound of fluoride ion in fluorspar is 4.3 cents. The cost per pound of fluoride ion in other compounds used in fluoridation ranges from 44.5 cents for hydrofluosilicic acid to 12.5 cents for silicofluoride. In the larger cities, the use of fluorspar can mean substantial savings; the estimated cut in costs for Washington, D. C., for example, is about \$50,000 annually.

The apparatus was developed by F. J. Maier, sanitary engineer director, and E. Bellack, both of the Division of Dental Public Health of the Public Health Service. Six months of testing preceded release of the device.

Previously, fluorspar was impractical for use in water supplies, because it does not dissolve readily. When this compound is used in the tanklike dissolver, an alum solution is fed into the device and an agitator keeps the fluorspar in suspension to help the dissolving process. The resulting



solution is drawn off and fed into the water system.

Manufacture of the equipment by private industry is expected to begin in the near future.

# Age Differential in Medical Spending

By SELMA MUSHKIN

*Out-of-pocket medical care expenditures of the urban population averaged \$65 per person in 1950, a relatively small sum when considered in relation to the average city family income after taxes of about \$4,000. Unlike most other items of consumer expenditures, however, medical care costs, in the absence of insurance coverage, are neither regularly recurring annual charges nor postponable expenses like those for such hard goods as automobiles or television sets.*

*In a single year, a relatively small number of persons incur a large part of the Nation's private medical care bill. More than 65 percent of all urban residents spent less than \$50 for medical care in 1950. At the other extreme, 7 percent spent \$200 or more, and their expenditures accounted for 41 cents of each \$1 of the private medical care bill in cities. Only one-fourth of 1 percent of all urban residents spent \$1,000 or more for medical care, but their expenditures represented 6 cents of each \$1 of private spending for medical care in cities.*

. . .

THE PATTERN of spending for medical care differs markedly among age groups. A large part of the medical expenditures for children is composed of small annual bills, whereas the major part of the medical care spending of the middle and older age groups is attributable to the large bills of a relatively few who become disabled or seriously ill.

Information on medical care expenditures was derived from a Public Health Service tabulation of schedules obtained by the Bureau of Labor Statistics in its survey of consumer ex-

penditures for 1950. In this survey, Bureau of Labor Statistics interviewers visited 15,180 dwellings in 91 cities during 1950 and 1951. As a result, complete and useful information was obtained for approximately 12,500 families. The Bureau reports that "the expenditure data from this survey appear to be the most comprehensive and reliable ever collected by the Bureau in its long experience in this field dating back to 1889" (1).

Preliminary tabulations from the Bureau of Labor Statistics survey were released in revised form in 1953 (1). Extensive analytical tabulations of the data were published for the first time in 1956 as a joint project of the Wharton School of Finance and Commerce of the University of Pennsylvania and the Bureau of Labor Statistics, financed in part by a Ford Foundation grant (2). The 1956 reports include a considerable volume of material on medical care expenditures in relation to family income, together with information on urban spending for food, clothing, housing, recreation, and other components of consumer purchases.

In the several reports on the survey, the sampling methods used to collect the information, including the selection of the 91 cities, the selection of the dwelling units in these cities, and the factors determining the size of the sample in each city, are described in detail (1, 2). The building up of nationwide urban estimates from the sample cities is also described in a published report (3). Work is still being done, by the Bureau, by the Wharton School, and by students of consumer income and expenditures, on evaluation of the distribution and aggregates of income, savings, and expenditures estimated from the survey findings (4).

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A considerable amount of the information obtained from the families on medical care costs and utilization of health services was not processed in the joint Bureau of Labor Statistics-Wharton School project. In fact, much of the detailed medical care information was not coded. Accordingly, the Public Health Service has undertaken a special study of consumer expenditures for medical care from a random subsample of the interviews. In this study, attention has been directed to (a) the composition and characteristics of the larger medical care bills, (b) the types of free medical services received by individuals in different economic circumstances, and (c) the variations in spending for medical care among different age groups. This paper presents the findings on age variations in spending.

### Study Methods

In selecting the subsample, the interview schedules were stratified by the amount of medical care expenditures. The subsample included all schedules reporting expenditures of \$1,000 or more, 50 percent of those reporting \$400 to \$1,000, 20 percent of those reporting \$200 to \$400, and 10 percent of those reporting some medical care expenditures but in amounts less than \$200. To provide a basis for evaluating medical care received by public beneficiaries, such as public assistance recipients, 50 percent of the schedules reporting no medical care expenditures were also included in the subsample. In all, 2,414 consumer units and 7,639 persons were included in the subsample out of the total of 12,489 consumer units interviewed by the Bureau of Labor Statistics. A comparison of the subsample with the whole sample showed that the two corresponded very closely in the family averages for medical care spending in each of the medical expenditure intervals.

Schedules selected from the tabulation which listed schedule numbers by amount of medical care outlay were pulled from each of the city schedule files. Transcripts were then made of the information reported by the family on medical care costs and family income. Information was transcribed separately for each member of the family unit on a family sheet, and hand tabulations were made from these

family sheets. The items of medical care expense covered in the survey are given on page 119.

The figures derived from the tabulations were weighted first to adjust for the subsampling ratio and then by the regional weights developed by the Bureau of Labor Statistics for each type of city, that is, large cities, suburbs, and small cities in each of three regions of the Nation, the north, the south, and the west. The total urban population represented by the survey sample was estimated by the Bureau of Labor Statistics to be approximately 95.6 million for the year 1950.

The study findings on age differentials necessarily reflect considerable error in the reporting of information by the family respondent, in sampling, and in estimation of aggregates from tabulated data. The total dollar volume of medical care expenditures is a computed amount, estimated by applying the midpoint of each of the dollar class intervals to the estimated number of persons in each age group spending amounts within these class intervals. For the open-end expense class, \$1,000 and over, the tabulated average expense figure for the sample in each region was used instead of a midpoint.

### Average Spending

Various surveys of hospital and physician services suggest a considerable variation in utilization of medical services by age. They suggest, for example, that the aged as a group use roughly 1.5 to 2 times as many days of hospitalization and 1.5 to 2.5 times as many physician services as all age groups in the civilian population (5).

There are marked differences also in out-of-pocket medical care expenditures by age (table 1). Although urban residents under 19 years of age spend half as much as the average urban resident for medical care, those 65 and over spend 28 percent more than the average.

Three out of each 10 persons living in cities are under 19 years of age, but about one-sixth of the amount spent for medical care is spent for these children. Aged persons in cities represent 8.1 percent of the urban population as



**Table 1. Average out-of-pocket medical care expenditures per person, by age group, urban population, 1950**

Age group	Average annual out-of-pocket medical expenses <sup>1</sup>	Percent of average expenditures of all age groups
All age groups.....	\$65	100
Under 6.....	29	44
6-18.....	35	54
19-44.....	72	111
45-64.....	93	142
65-74.....	87	134
75 and over.....	76	118

<sup>1</sup> Amounts are adjusted to the \$65 average expenditure for all age groups as computed by dividing the Bureau of Labor Statistics total medical care expenditures for all urban families by the Bureau of Labor Statistics estimate of urban population.

**Table 2. Percentage distribution of urban population and of urban out-of-pocket medical care expenditures, by age group, 1950**

Age group	Percent urban population		Percent out-of-pocket medical expenditures
	In sample	In United States <sup>1</sup>	
All age groups.....	100.0	100.0	100.0
Under 6.....	12.7	11.9	5.6
6-18.....	19.1	17.6	10.3
19-44.....	38.3	41.1	42.7
45-64.....	21.3	21.3	30.3
65-74.....	5.8	5.6	7.8
75 and over.....	2.8	2.5	3.3

<sup>1</sup> 1950 Census.

of 1950, but their medical care bills account for about 11 percent of the total (table 2).

### Skewed Distribution of Spending

Averages are a peculiarly inappropriate base for evaluating consumer medical care expenditures. The skewed distribution of amounts spent by the urban population for medical care is shown in table 3. The figures reflect whatever leveling effect has developed out of coverage under voluntary health insurance since premiums are counted as part of ex-

penditures while benefits received are excluded. A sizable proportion of medical care expenditures represents the spending of the small proportion of urban people with large medical bills.

The uneven distribution of medical care outlays is especially characteristic of the older age groups. About 8 percent of urban residents 19-44 years of age spend \$200 or more a year, but these persons spend 39 percent of the total spent by this age group. At ages 45-64, 11 percent of urban people spend \$200 or more, but their expenditures account for over half the spending for the age group. At ages 65-74 and 75 and over, 9 to 10 percent of urban people spend \$200 and over a year, and their expenditures account for 51 and 57 percent, respectively, of the medical care costs attributable to each of the age groups (tables 4 and 5).

The medical care spending pattern for children is considerably different from that for other age groups. A heavy concentration of expenditures in the large bills of a relatively small proportion of consumers has been noted repeatedly in the past as characteristic of family medical care spending and is indicated here for people 19 years of age and over. Expenditures for children, however, are largely concentrated in small annual charges. More than \$7 out of each \$10 spent for children under 6 is in amounts less than \$100, and fully one-half of the expenditure for children is in amounts less than \$50. In the age group 6-18

**Table 3. Percentage distribution of persons and of total out-of-pocket medical care expenditures, by amount of medical care expenditures, urban population, 1950**

Out-of-pocket medical care expenditures	Percent of persons	Percent of total medical care expenditures
All urban consumers.....	100.0	100.0
None.....	17.4	-----
\$1-\$49.99.....	47.9	17.4
\$50-\$99.99.....	17.5	19.1
\$100-\$199.99.....	10.2	22.2
\$200-\$299.99.....	3.7	13.3
\$300-\$499.99.....	2.1	12.1
\$500-\$999.99.....	1.0	9.8
\$1,000 and over.....	.2	6.1

**Table 4. Percentage distribution of persons in each age group by amount of medical care expenditures, urban population, 1950**

Out-of-pocket medical care expenditures	Age group					
	Under 6	6-18	19-44	45-64	65-74	75 and over
All urban consumers.....	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0
None.....	25. 7	26. 3	11. 4	12. 8	19. 2	30. 7
\$1-\$49.99.....	61. 3	55. 8	46. 3	39. 1	41. 3	37. 2
\$50-\$99.99.....	9. 0	11. 3	21. 5	23. 1	12. 9	11. 6
\$100-\$199.99.....	2. 9	4. 3	12. 5	13. 8	16. 7	11. 4
\$200-\$299.99.....	(0. 6)	1. 5	4. 7	5. 6	3. 8	(2. 8)
\$300-\$499.99.....	(0. 4)	(0. 6)	2. 5	2. 8	4. 2	(4. 1)
\$500 and over.....	(0. 1)	(0. 2)	1. 1	2. 8	(1. 9)	(2. 2)

NOTE. Figures are shown in parentheses when the product of the percentages and the unweighted count of persons in the sample in the given age group is less than 10.

years, \$6 out of each \$10 spent is in amounts less than \$100. In part, the difference in the pattern of medical care expenditures by age reflects variations in sickness experience by age. The incidence of acute illness is higher among children than among older age groups, whereas the incidence of chronic illness is higher among older age groups than among children (6, 7).

#### Health Information Foundation Study

While the Public Health Service study of medical care costs was in process, the Health Information Foundation published its findings from a 1952-53 survey of family medical costs and voluntary health insurance (8). Differ-

ences in definition of medical care expenditures, survey design and scope, and dates of the interviews, as well as differences in age grouping make direct comparison of the two sets of findings difficult. Health Information Foundation data are for a later period and include the rural population; the Public Health Service study related exclusively to the urban population and covered 1950 expenditures. However, the similarities and variations in findings are of considerable interest and at points suggest questions which warrant further study and analysis. These two studies are the first to provide nationwide information on medical care costs by age since the 1928-33 studies of the Committee on Costs of Medical Care. The many changes that have taken place since this

**Table 5. Percentage distribution of medical care expenditures of each age group by amount of medical care expenditures, urban population, 1950**

Out-of-pocket medical care expenditures	Age group					
	Under 6	6-18	19-44	45-64	65-74	75 and over
All urban expenditures.....	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0
\$1-\$49.99.....	50. 2	37. 7	15. 1	10. 0	11. 2	11. 5
\$50-\$99.99.....	22. 2	22. 9	21. 1	17. 7	10. 6	10. 8
\$100-\$199.99.....	14. 0	17. 3	24. 4	21. 0	27. 2	21. 2
\$200-\$299.99.....	(4. 8)	10. 1	15. 3	14. 3	10. 3	(8. 5)
\$300-\$499.99.....	(4. 6)	(6. 5)	13. 1	11. 5	18. 4	(20. 1)
\$500 and over.....	(4. 2)	(5. 5)	11. 0	25. 5	(22. 3)	(27. 9)

NOTE: Figures are shown in parentheses when the product of the percentages and the unweighted count of persons in the sample in the given age group is less than 10.

committee made its survey indicate considerable caution in using its data as a basis for appraising present-day medical expense patterns.

The HIF study reports \$65 as the average gross charge for medical care per person in the total civilian population for 1952-53. This is exactly the same amount as the PHS study found for the urban population in 1950.

Average gross charges for children under 6 years of age are reported at \$28 and for children 6-17 at \$38 in the HIF study. Out-of-pocket expenses for children under 6 are estimated at \$29 from the PHS study; out-of-pocket expenses for those 6-18, at \$35. There is a similar close correspondence of the figures for persons in the adult ages, except that the HIF figures suggest a larger increase in expenditures for persons 65 years of age and over than is indicated by the PHS study. The HIF

study shows a \$102 average gross charge per person 65 and over; the PHS study indicates out-of-pocket costs of \$83 per person 65 and over.

In part, the difference for the 65-and-over age group is attributable to the difference between gross charges and out-of-pocket medical care expense. Gross charges as defined in the Health Information Foundation study include amounts paid out for physician, hospital, dental, and other medical care services and for services received as insurance benefits. Out-of-pocket medical expense in the Public Health Service study does not include services received as insurance benefits but includes health insurance premiums paid. Benefits received by older people may exceed their own health insurance premiums. To the extent that this is so, health insurance may serve at present to spread the risk among age groups in the covered

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#### Definition of Medical Care Expenditures

Medical care expense is defined in the Bureau of Labor Statistics study to include health insurance premiums paid by the family, medical expense incurred in cases of illness (other than expense covered by an insurance plan), and expenses for such items as routine physical and dental examinations and nonprescription drugs. Expenses were reported for care received during 1950 even though payments were not made until after the close of the year.

The family member interviewed was asked to report expenses for each of the following items of medical care for each family member:

*Premiums.* Premiums for 1950 for hospitalization, surgical, and medical service plans; premiums for 1950 for disability, health, and accident insurance.

*Expenses while hospitalized.* Room or ward; physician, specialist, and surgeon services; nursing services; all other charges for hospitalization (including laboratory tests, X-rays, etc.); ambulance services; combined bills (if separate items not shown).

*Other medical care expenses.* Physician, specialist, and surgeon services; dental care; chiropractor, faith healer, etc.; oculist, optometrist, eye

glasses, etc.; laboratory tests (other than in connection with hospitalized illness); X-rays (other than in connection with hospitalized illness); nursing care at home; prescription and nonprescription drugs and medicines; appliances and supplies; other medical care expenses.

A single expense figure was reported on some schedules for the entire family. Typically, expenditures for drugs and those premiums paid for family insurance coverage were reported in this way. For the present study, allocations were made to individual family members on the basis of the interviewer's notes when such notes indicated an appropriate basis for apportionment to individuals. In other instances, drug expenditures were apportioned equally among family members, and insurance premiums were apportioned among the family members covered in accordance with the usual practice in insurance plans of differentiating premiums for individual and for family membership without scaling premiums to family size. Premiums were allocated in equal sums among family members 18 years of age and over covered by a single premium payment.

population, and benefits added to direct personal expenditures may be larger for the older age groups than their own out-of-pocket payments, including health insurance premiums paid.

Comparison of the distribution of persons by amount of charges also indicates a general similarity in the findings of the two studies. The proportion of persons with bills of \$200 or more, for example, is 7 percent in the PHS study, and the proportion with bills of \$195 or more is 8 percent in the HIF study. The HIF study consistently reports a larger proportion with "no charges" than the PHS study, but again the difference may be largely the result of differences in definition of medical costs. The former study relates exclusively to medical costs paid by the family or by the insurance plan; the latter includes premiums paid for protection, with the result that persons who receive no medical services but prepay for future expenses are reported as making an out-of-pocket expenditure for medical care.

#### Need for Additional Information

The information on medical charges of individuals was compiled by the Health Information Foundation as a part of a study principally concerned with the distribution of costs for personal health services among families and the effect of voluntary health insurance in spreading the costs. The Bureau of Labor Statistics recorded information on medical care spending for individual family members largely to improve the reporting of total family expenditures. Although the family unit is of considerable importance in assessing the economic burdens of medical care, data on spending of individuals are needed for many purposes and by many groups such as health insurance carriers concerned with planning medical care benefit and coverage programs. In develop-

ing additional studies on the economics of medical care, it would appear desirable to plan the collection of information about the medical care spending habits of individuals and to broaden the scope of knowledge about the variations in medical care expenses by age especially in relation to differences in sickness experience.

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## What Public Health Nurses Like About Their Jobs

By WINIFRED KELLOGG, R.N., B.S., M.P.H.

**P**UBLIC HEALTH NURSES like the broad scope and variety of work that is public health nursing—the opportunity nursing gives for contact with all kinds of people, the challenge represented in the needs discovered, the satisfaction inherent in accomplishment, the stimulus to personal and professional growth.

Public health nurses leave their jobs for personal and family reasons, for more schooling and broader experience. They think of leaving their jobs when they are dissatisfied with supervision, administration, and personnel policies. Many stay, in spite of dissatisfaction, because of pension plans and for personal reasons.

Public health nurses who like their jobs are the most effective recruitment agents. Public health nurses with major dissatisfactions that are misunderstood or ignored dissipate their energies in tensions and function at a low level of efficiency. Their dissatisfaction is apparent to others. It may have an important bearing on the decreasing ratio of public health nurses to population.

These are conclusions from a recent survey of public health nursing in Michigan, described below.

Because more public health nurses are needed in Michigan, the department of public health nursing of the Michigan League for Nursing

in 1954 conducted a job satisfaction study for public health nursing similar to that for hospital, industrial, and office nursing in the Cunningham Drug Foundation survey of nursing needs and resources in Michigan. The purpose was to find the best means of recruiting nurses and of keeping active those who now are public health nurses.

The questionnaire used in the Cunningham job satisfaction survey was revised to make it applicable to public health nursing. Guidance in preparing the questionnaire was obtained from research specialists of the University of Michigan School of Public Health and from the Michigan Department of Health. Two hundred seventy-five questionnaires were sent to a random sampling of nurses employed in service agencies: one questionnaire was sent to every third nurse on the Michigan Department of Health list. One hundred sixty, more than half of the questionnaires, were returned: 126 by staff nurses, 34 by directors and supervisors.

Respondents included from 15 to 30 percent of all nurses employed in each type of agency and represented all parts of the State. They ranged in age from under 25 to over 55; in public health nursing experience, from less than 6 months to more than 30 years; in education, from no college attendance to graduate degrees; and, in public health nursing theory, from no instruction to more than 1 year.

Respondents were asked how they became aware of public health nursing vacancies, why they entered public health nursing, why they chose their jobs, what they liked and disliked about their jobs, whether they planned to

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change and why, and what they planned to do if they changed. The variety of answers were studied, coded, and tabulated. Many respondents gave more than one answer to a question, and when they did not evaluate the relative importance of their answers all of those which could be coded were tabulated.

Here is a brief summary of their most frequently repeated answers, a few quotations, and some generalizations based upon their remarks.

### *Why public health nurses leave their jobs*

Fifteen respondents had plans to leave their jobs, and an additional 20 were thinking of leaving. Nine of the thirty-five gave personal or family interests as reasons for their leaving. Six were planning to go to school. Thus, 9 percent of the total respondents were thinking of leaving their jobs for reasons which were unrelated to job satisfaction.

The remaining 20 who were thinking of leaving, or 13 percent of the total respondents, expressed great dissatisfaction regarding their jobs.

Sixteen were dissatisfied with factors coded under "supervision" or "administration." Twelve of these were staff nurses; 4 were supervisors or administrators. Six of the 16 complained of personal relationships, 5 of work pressure, 5 of supervision. One, a graduate of less than 6 months from a basic degree program, said that she was "stagnated taking care of the chronically ill." One supervisor was not sure of her ability to supervise.

Seven listed factors which coded under "personnel policies" as important to their decision to leave their jobs. Three of the seven mentioned "administration" too and are included in the 16 reported above. One respondent, in complaining of her inadequate salary said: "The satisfaction of saving humanity doesn't always fill the gaps." Salaries and reimbursement for travel were most important; vacations and leave policies were mentioned.

### *What public health nurses dislike*

Public health nurses dislike work pressure that inhibits effectiveness. They are especially unhappy when they believe that such pressure

results from confusion, duplication of effort, a lack of administrative planning, and uncertainty regarding job responsibility. They dislike interpersonal relationships that are not based upon mutual respect for all. They dislike supervision that restricts development or fails to aid in growth. They dislike time-consuming activities which they believe do not require public health nursing skills. They dislike working where salaries and reimbursement for travel are inadequate, and where vacation and leave policies are restrictive.

Fifty-eight respondents (36 percent of the total) either gave no answer or said that there was nothing they disliked. Thirty-seven staff and 17 supervisors (34 percent of the total) listed factors related to supervision and administration as a major source of dissatisfaction.

Work pressure was most frequently mentioned. Eight staff nurses and five supervisors related this entirely to staff shortages. The supervisors indicated that there was "just no way to get the work done" even though they put in a great deal of their own personal time. Four staff nurses and three supervisors related work pressure to lack of administrative planning; to new projects being started before those under way were completed; to too many department heads and too few staff workers; to difficult relationships between individuals and divisions; to confusion and duplication; to uncertainty regarding job responsibility; and to a need for more definite written policies.

Interpersonal relationships were mentioned as a source of dissatisfaction by 19 staff nurses; supervision was a dissatisfaction for 8. Two complained because they had no supervision. Two complained because their supervisors lacked information regarding the community and made no effort to learn. One said that conferences following field supervision were delayed too long. Three complained that they could not exercise initiative or were required to follow routines too closely. Poor utilization of time was a source of dissatisfaction to three. Fatigue resulting from transporting children to clinics, dislike of truancy work, preoccupation with work that could be done by a secretary or clerk were mentioned.

Twenty-three percent of the respondents dis-

like records and reports: Thirty staff nurses and six supervisors listed preparing records and reports as the part of their job they disliked most. Seven of the thirty-six complained of other things in addition to records. Only one mentioned work pressure. Some related dislike to a lack of adequate clerical staff. The highest percentage of dislike of records was among those with the least education. There was a lower percentage of dislike among nurses who had been with the agency for more than 5 years.

Ten percent dislike environmental factors. Travel conditions, unsatisfactory office space and equipment, and inadequate community resources were mentioned. Six percent dislike personnel policies. Salaries and reimbursement for travel were first in importance, vacation and leave policies next.

### *What nurses like about their jobs*

One hundred thirty-one individuals (82 percent of the total) said that they like the type of work they do. That is, they like working with children, with families, with community groups, with young staff and students. They like to see people get well; they like to help people stay well; they like the satisfaction of knowing they have helped. Nineteen percent mentioned factors related to supervision and administration—such things as good personal relationships, freedom to plan, opportunity to use initiative, lack of tension, pleasant working conditions, opportunity for professional growth. Fifteen percent mentioned policies regarding education, advancement, hours of work, and salaries. Only three of these individuals mentioned salaries.

Public health nurses like their jobs when they are able to see that their work is effective; when they have the guidance needed for growth and the freedom to exercise initiative in accordance with ability; when policy is clearly and flexibly applied to allow for individual and circumstantial differences; when interpersonal and interdivisional relationships are good; when lines of communication are clear; and when administration has a realistic understanding of what is involved in getting a large volume of work done.

### *Why nurses take specific jobs*

Nurses take jobs in specific agencies located near family or friends or near educational and cultural institutions. They take jobs in specific agencies when through agency personnel or field work they learn that the agency is a "good place to work," offering opportunities for growth and job satisfaction, and that personnel policies and personal relationships are good.

Forty-seven percent of the respondents chose jobs so they could be near families, friends, or educational and cultural facilities. Thirty-four percent chose jobs because of the broad scope of the job or the type of work. Twenty-four percent were influenced by contact with public health nursing personnel and others who knew about the work. Twenty-three percent gave reasons which coded under "personnel policies." Sick leave policies were mentioned several times.

### *Why they take public health jobs*

Forty-nine percent of the respondents said in a variety of ways that they entered the field of public health because they were interested in people, liked children, liked working with families, liked school work, or liked community work. Their replies were coded under "broad scope of the work." Contact with public health nurses and others who knew about the work influenced the decision of 42 percent of the respondents. Experiences during basic nursing and field work were frequently mentioned. Personnel policies were important to 25 percent; specifically mentioned were hours of work and policies regarding education, advancement, and salaries. Job exploration was mentioned by 18 percent of the respondents.

### *How nurses learned about vacancies*

Nurses enter the field of public health when through contact with public health nurses and others who know about the work, they become aware of the opportunities and challenges it presents.

Two-thirds of the respondents learned about their jobs from staff or board members, relatives, friends, physicians, or field work in the



agency. Very few learned about their jobs from such sources as professional journals and employment agencies.

### *Plans about changing jobs*

Of the 29 nurses who were thinking of leaving their jobs, exclusive of those who were going to school, 1 will probably not leave, 7 will take other public health nursing jobs in Michigan, 9 will take public health nursing jobs in other States, 8 will enter a different field of nursing, and 4 will leave nursing altogether.

The four who said they would leave nursing were staff nurses, and all were married. Two were leaving for personal reasons and two because of work pressure, personal relationships, and the wrong kind of supervision.

The percentage of respondents who were planning to leave their jobs was highest in those under 25 and lowest in those over 55.

### *Unfinished business*

Nurses in all types of agencies expressed major dissatisfaction regarding certain aspects of their jobs. There is no possible way to judge the validity of respondents' complaints. Administrative and supervisory practice may not be as bad as some think, but as long as that thought remains, the agency and each individual in it has a problem. Certain it is, there is room for improvement. The administrator, supervisor, or staff nurse who disclaims responsibility in the situation is apt to be the very one who most needs to take it seriously. Dissatisfaction when properly understood and utilized may serve as stimulus to improvement.

Many studies have been made in Michigan and throughout the country. Too frequently, reports are compiled and filed for future discard. We hope to do better with our job satisfaction study. Though we acquired little new information, we do believe that our findings are significant, and we intend to use them as a stimulus to improvement. We believe they have value too for other States.

A brief mimeographed report of the study, which is essentially the same as the foregoing findings, was printed in April 1955 and distributed to nursing agencies by the public health

nursing section of the Michigan Department of Health. Accompanying the report was a list of questions to consider in analyzing their own situation.

### *Questions for consideration*

The list of questions distributed with the job satisfaction report is reproduced below:

1. Which of the findings reported here are true for your agency?

2. Are staff and board members aware of their potential strength as recruitment agents? How can such awareness be stimulated and utilized?

3. Do field staff and board members have access to application forms, personnel policy outlines, and promotional materials? Do they make use of them?

4. Are board and committee members and others in the community aware of the tremendously satisfying aspects of the public health nursing job? Can these people be made aware of this factor so that they will talk of it among their friends and relatives, some of whom may happen to be nurses?

5. Are staff members utilizing the educational and cultural facilities of the community in their own personal development? If such facilities are inadequate, could more adequate resources be created and developed?

6. Do all staff members understand supervisory and administrative processes? Are communication lines clear? Do the field staff, supervisors, and junior administrators have some freedom to make professional decisions and exercise initiative?

7. When administrators decide to embark upon a new program, do they either add staff or cut the established program to make time for the new? Do they consider clerical as well as other needs?

8. How can specialized division heads keep themselves and each other aware of the pressures created by their demands upon generalized supervisors and staff?

9. What can be done to help nurses with records and reports? Is adequate clerical help provided? If full-time clerical help is either not needed or not available, has an attempt been made to find part-time workers? Do nurses



have adequate space and a quiet time for doing clerical work? Are they given an adequate introduction to recordkeeping? Do they need courses in rhetoric? Is information requested that is not essential? Are field nurses aware of uses made of statistical information collected?

10. Are personnel policies at least up to the minimum standard recommended by the profes-

sional nurses' association in your community? How satisfactory are the policies about salaries, mileage rates for the use of personal cars, working hours, vacation, and leave? Can an employee who has served for many years get a 1- to 3-month leave of absence, other than for schooling, without loss of seniority or civil service status?

### **Program for Evaluating Heart Disease Drugs**

A grant of \$575,000 to evaluate the effectiveness of drugs used in heart disease treatment was awarded Dr. Alan E. Treloar, director of research of the American Hospital Association.

The research grant, the largest of its kind ever made by the National Heart Institute of the Public Health Service, will finance a nationwide program coordinating the work of a number of research teams, as yet to be selected.

The projected large-scale study involves a testing program to determine the most effective drugs, or combinations of drugs, and dosages among the many new forms of treatment developing in the heart field. Initial emphasis will be on hypertension.

Dr. Treloar and the American Hospital Association envision the formation of an advisory board to set up the program's guiding principles and to make broad policy decisions. The board will be composed of eminent medical research workers and clinicians; it is expected to include a representative of an appropriate committee of the American Medical Association and also of the American Heart Association.

A central staff located in Chicago will include a clinician and a biostatistician who will coordinate project activities and supply administrative and biostatistical services for investigators. Each hospital and clinical research laboratory collaborating in the program will provide a representative for a technical committee. This group will serve as a means for constant communication between the research teams and will determine details of procedure.



# The San Juan Basin Plan

By **GEORGE MOORE, M.D., M.P.H.**

**I**N THE EVENT of a national emergency from enemy attack, the small cities, towns, and villages of America will save the populations of many of the larger industrial cities. This statement cannot be questioned since the primary targets in the United States include most large cities with their factories and congested populations. How can the small cities and towns in rural areas save their urban neighbors? The San Juan Basin of Colorado has attempted to provide an answer.

Some 33,000 people live in the San Juan Basin, a four-corner, 12,000-square-mile area flanked by the high mountain ranges of the Rockies. The basin is central to Albuquerque

in New Mexico, to Phoenix in Arizona, to Salt Lake City in Utah, and to Denver and Pueblo in Colorado. Distances to these cities range from 200 to 500 miles. Most east-west and north-south highways in this region of the southwest converge on Durango and Cortez, Colo., the basin's largest communities. Durango has a population of 12,000, Cortez, 5,000.

In the event of enemy attack, no target in the basin would be worthy of enemy bombs, but dangers do exist. Radioactive fallout from the bombed cities may drift over the basin. Enemy saboteurs may plot destruction of vital installations. Thousands of evacuees may seek refuge in our homes and hospitals.

The danger of radioactive fallout has been met by establishing in Durango, at a cost of about \$1,000, a detection station that houses a Staplex single-volume air sampler. Manned by a team of health department personnel, the instrument is capable of detecting minute amounts of radioactivity in the air before the danger becomes serious, thus providing hours of warning. It operates on 110-volt current or by a generator.

A weather bureau official computes the fallout patterns and relays his findings to our radio

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*Dr. Moore, director of the San Juan Basin Health Unit, Durango, Colo., is one of three physicians appointed by the San Juan Basin Medical Society to plan for medical care in an areawide emergency. An account of Dr. Moore's experience as chief public health officer, United States Operations Mission to Nepal, 1952 to 1954, appeared in the April 1954 issue of Public Health Reports, p. 340.*

station for Conelrad broadcasts on 640 and 1240 AM frequencies. If, after an attack, the team should find that fallout is a serious hazard, civil defense officials could confidently call for withdrawal toward a safer area. Mass evacuation of the basin's families can thus be a leisurely and simple procedure.

As to the second danger, we can expect that one-way bombers after their bombing runs from the north might land on the flat mesas and prairies of central and southwest States. We can also reasonably expect that airmen conversant with American customs and perhaps trained in sabotage will enter cities and towns unnoticed and mingle with the populace. Their job would be to foment panic, to set fires in forests and lumberyards, to destroy

bridges, powerplants, and oil dumps, and to contaminate water and food supplies with chemical and bacteriological agents.

A third problem, fraught with danger too, is the extent of our preparedness to receive and care for evacuees. If a city such as Albuquerque with a population of 160,000 has at least 3 hours' warning, it is expected that about 150,000 persons could be evacuated. Possibly 20,000 or more refugees will find their way northward across the desert to the mountainous San Juan Basin.

Many of these evacuees, hungry, desperate, sick, and afraid, might conceivably ransack and loot stores, gasoline pumps, and food warehouses, leaving nothing for evacuees or residents alike. And without further food and

## for Small City Survival



stores for 3 weeks or more, the basin's inhabitants would themselves become victims of war. Therefore, an orderly reception of evacuees is necessary to insure help and rapid recovery for all.

### **The Fortress City**

The survival plan is for Durango to consider itself a fortress in time of attack. At the flash of national alert, the city will go under civil defense authority, similar to martial law in many respects. All emergency teams will proceed to their stations.

Main highways leading into Durango will be barricaded with bulldozers and trucks, leaving detour routes around the city open for outside traffic as needed. All traffic within the city, except emergency and official vehicles, will be stopped. Places of business and service stations will be closed. Armed guards will be posted in front of food stores to prevent runs on supplies. School children will be sent home immediately. People will be warned to stay in their homes.

Thus, the city will be ready for attack, teams will be at their posts, and residents and workers will be at home waiting for Conelrad reports on their radios. In this period of waiting the public will ready their cars, fill tanks with stored supplies of gasoline, draw off water for storage, and prepare baskets of food. Conelrad in cooperation with the detection station will advise of fallout from bombed areas. If mass evacuation of the city is necessary, Conelrad will describe the routes to designated rendezvous points.

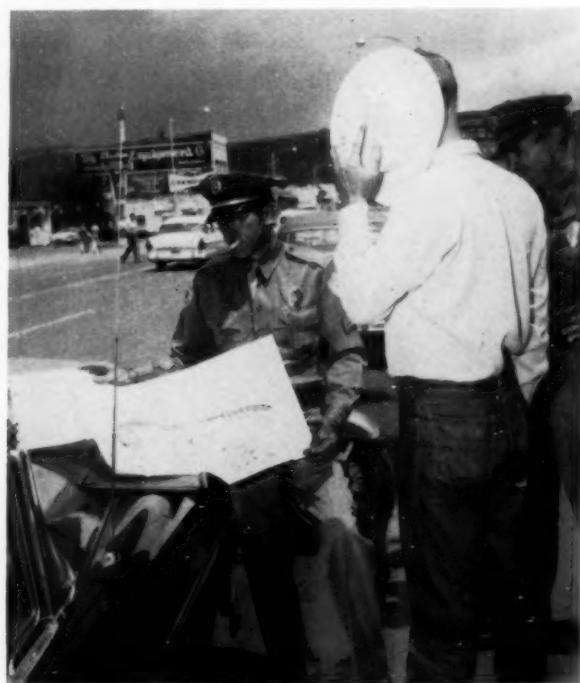
### **Reception of Evacuees**

When the first evacuees arrive at Durango, they will be met at the roadblocks by the traffic control teams. If they prefer to detour the city, they will be offered a cup of coffee and a sandwich by a welfare team and then directed to follow the markers. Gas stations at each barricade will ration a few gallons of fuel, if needed, to each vehicle as long as the gasoline lasts.

For the 20,000 evacuees who prefer to stay in Durango, a different procedure is planned.

These individuals will be met at the barricades by monitoring teams who, with geiger counters and ionization chambers, will check for radioactive fallout dust. Vehicles found to be radioactive will be either left outside the barricade or motioned on toward the detour, as the occupants prefer. Vehicles found free from contamination are then screened by the police for saboteurs. Luggage and identification will be checked thoroughly before either a vehicle or person is permitted to pass the barrier. Arrangements have been made for the care of pets.

Each barricade will have a mobile first aid team led by a physician. The team will send injured and ill evacuees, by ambulance or truck, to one of three first aid centers temporarily established in the Durango public schools. The injured and sick will be treated at the first aid stations and then either transferred to a hospital or released to one of five registration centers. The healthy evacuees will be directed to a wide parking expanse where traffic teams will park the cars in an orderly fashion. Radios at the barricade will keep the teams informed of possible new dangers.



**"Saboteur" found on public street by Durango police during simulated alert, July 1956.**



At the parking lot, the evacuees, carrying their luggage, will board school buses waiting to shuttle them to the registration centers. The centers are to be located in public buildings central to each of five main sections in the city. They will be manned by volunteers and welfare officials. After registration, evacuees will be sent on foot, in company with boy scouts or uniformed guides, to their assigned quarters in the homes of residents. A list of available rooms is ready in anticipation of this maneuver.

In the interim, the fire department will have been waiting for emergency calls, and the police department will have stationed guards at bridges, gas depots, water works, and other vulnerable sites. Factories will have assigned men to guard industrial targets. The relative absence of street traffic will simplify the job of safeguarding people, homes, and key targets. Likewise, the detection of looters and saboteurs will be less difficult.

The next morning should see Durango intact with all evacuees received and placed. The care and conservation of what is left then begins.

#### **Realistic Planning**

A full count of evacuees and an inventory of food, clothing, gasoline, and medical supplies will determine how the city will live for the next few weeks. Health officials will check water and food for possible contamination and will try to maintain near normal services. Twice a day, volunteers and welfare and health personnel will set up food lines at the fairgrounds and at large restaurants.

For supplementary needs the granges have accumulated stores of extra supplies of canned food, fruit, potatoes, and gasoline. These will be rationed as needed. At any time, we could supply 25,000 to 30,000 pounds of milk, 25,000 head of beef cattle, 60,000 sheep, and 1,000 hogs. Flour, pinto beans, and grain are abundant. Food, therefore, should not be a problem.

If the watershed becomes contaminated with fallout, we would have enough stored water, once the reservoir is covered as planned for 1957, to last evacuees and residents 3 weeks. Water supplies have been tremendously improved this year over last by the addition of



**Sheriff and civil defense aide find "bomb" under oil tank in Durango suburban area.**

a new filter plant in Durango. Water during most of the year is plentiful. Most farms have wells, and water will be transported to the cities as needed. Our fast-flowing streams could in warm weather decontaminate most of the watershed within a week. Sewerage, though inadequate, also has top priority in city budgeting.

The police and firemen in Durango have been trained by former Army servicemen in many types of counter sabotage. The police and fire departments held an impressive operation alert in July 1956 together with civil defense teams, health department personnel, and amateur radio operators. The exercise simulated a realistic emergency complete with enemy agents plotting to contaminate water, incendiary fires ignited in army-type smoke pots, and time bombs planted at strategic sites (see pictures).

During an alert, auxiliary police will patrol the filter plant and reservoir, and our sanitation staff will stand by for any emergency. Continuous check will be made on the water for turbidity, changes in pH, presence of bacteriological agents, and deposits of radioactive fallout if it is a problem. The small laboratory of our health department and the technician in charge are well equipped and well qualified to make bacteriological examinations. We hope to acquire a millipore filter soon.

All of the health department staff have received special training in civil defense through courses in Denver and in Washington. They in turn have helped to train civil defense work-

ers in Durango (see program). The monitoring teams have been trained in food and water decontamination. The fluorescent antibody and phage tests for rapid bacteriological diagnosis as well as complete kits for CW (chemical warfare) sampling will be added to our program as soon as these materials are released. At present, public health defense against BW and CW attacks is not particularly effective until the specific agent is determined and after people are already sick and dying.

The San Juan Basin Health Unit now has a full year's determination of background counts on radioactive fallout. The Colorado State Health Department gave valuable assistance in calibrating the air sampler and in training health personnel in radiation detection. The weather bureau official who will chart and relay fallout reports was sent to the Sandia Corporation in New Mexico for special training.

#### **Natural and Wartime Disasters**

The survival plan will utilize every available inch of space in the hospitals as well as in auxiliary buildings. The only hospitals in the basin are the two hospitals in Durango and the hospital in Cortez. Altogether we count on having 300 hospital beds, 25 physicians, 6 dentists, 4 veterinarians, 185 first aid workers, and about 150 nurses and aides. All available nurses have been listed. If disaster strikes a nearby city, a team of 6 physicians with nurses and helpers and supplies is ready for call.

A move has been made to bring Federal Civil Defense Administration stockpiling to the basin because of the remoteness of the stockpiles in Texas and Utah and at Greeley, Colo. All hospitals are stockpiling medical supplies and rotating perishable items. Eventually, their stockpiles will hold a year's supply in advance.

Vaccines and serums are not being stockpiled to any great extent because it is not in our present plan to offer immunizations to the public at large. The health unit has been attempting to provide mass immunization through school programs. Immunization levels among school children are well over 85 percent for smallpox and diphtheria-pertussis-tetanus.

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### **Civil Defense Training Course**

#### **San Juan Basin Health Unit**

##### **First Day**

Strategic briefing of civil defense.

Effects of modern weapons. Films "Let's Face It" and "Operation Ivy."

Nuclear weapons and radiation detection instruments. Film "A Is For Atom."

Evaluation of radioactive fallout hazard.

Biomedical effects of radiation.

Chemical warfare.

Bacteriological warfare.

Films "Flash of Darkness" and "Target You."

##### **Evening**

Films "Atomic Attack" and "Frontline of Freedom."

##### **Second Day**

Civil defense analysis.

Attack warning. Film "Conelrad."

Civil defense organization.

Organization of health services, casualty care, health and medical supply program, and the improvised hospital.

Durango as a typical support area, urban analysis.

Evacuation, shelters, and cover. Films "Escape Route" and "Operation Welcome."

Rescue training. Film "Trapped."

Registration and warden services.

Police and traffic services.

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In addition, the Indians in the basin are now protected with typhoid-paratyphoid vaccine.

We have tried to be realistic in planning for various types of casualties. In addition to screening evacuees for communicable disease, we have made specific provisions for isolation of disease suspects at first aid stations, for the use of churches and churchmen to help alleviate hysteria and panic, and for hospitals to set aside wards for radiation victims. Evacuees with burns, fractures, amputations, and other serious conditions are not expected in great numbers because of the basin's distance from target areas. They may be sent here later, however.

Of course, no one knows how many evacuees the basin might receive, but, for our planning, a total of 20,000 has seemed a practical number to assume. Durango, with new discoveries of oil, gas, and uranium, has become a boom town since the war. Housing is at a premium, and most new homes are ranch style and small. We would have trouble accepting more than 20,000 new people, but if we had no choice, we would use barns, rodeo facilities, and all available public buildings.

Considerable interest has been expressed in our plan. A mutual aid pact is being drawn up with Farmington, N. Mex., the first large city south on the road to Albuquerque. Farmington will detour evacuees to us as we will to them if cities to the north of Durango are bombed. Other cities in Colorado and New Mexico and even in South Dakota have shown interest in organizing similar programs. It

has been obvious that the public is worried about the future and will work enthusiastically if we lead the way and provide hope.

The basin also has an alternative emergency plan that covers the natural disasters any community might experience from train wrecks, fires, collapsed buildings, and flood. Not more than 50 casualties are expected from any one isolated incident. These we will care for by using the maximum available beds in the basin's hospitals. The hospitals are prepared, as needed, to reroute their patients and to provide morgues and extra dispensary space. Physicians have specific assignments.

Now that all phases of both plans are complete, we trust that the basin will be ready for whatever comes, natural and war disasters alike.

NOTE: The photographs were supplied through the courtesy of Pennington Studio, Durango, and the *Durango Herald News*.

## idea

### *The Personal Touch*

Though approximately 400 persons receive postgraduate training in public health every year, the profession is probably losing between 600 and 700. States fortunate enough to have a reasonable number of public health workers have usually obtained the greater proportion from adjoining areas.

Our replacement needs and the additional workers needed to meet the demands of a growing population have to be viewed realistically in the light of the decreased supply of young people, brought on by the reduced birth rate from 1930 to 1941, and of the many inducements that are currently offered to them.

Industry's profits at the moment are of such magnitude in relation to

the tax structure that industries can afford to pay salaries to professional personnel for beginning employment in ranges that industries themselves recognize are greater than the employee is actually worth.

Training for public health work, usually provided from public funds because it primarily benefits the employer, has declined appreciably because of cuts in Federal grant funds. Some States have been reluctant to finance training or have been unable by law to do so. Thus, the cost of preparation is devolving upon the individuals themselves even though financial compensation, when employed, does not compare favorably with that of industry.

Since competition for personnel is so keen, I would like to suggest that there is a common need for bringing to seventh, eighth, and ninth graders some concept of the many interesting things that can be done in public health work. I would encourage maximum sensitization of this

group through whatever channels you can use to reach them. Perhaps too few of us have thought about the influence we could have by working actively in such groups as the Boy Scouts and Girl Scouts and the Hi-Y and 4-H clubs.

The most effective recruitment program I have seen for getting young ladies into a nursing school was one in which each student was given the responsibility for seeking out some worthy successor from her former high school and giving her a pledge pin.

Our recruitment programs must be personalized if they are to be effective.

—HAROLD M. GRANING, M.D.,  
*regional medical director with the Public Health Service, Region 5, Chicago, in a speech at the annual meeting of the Middle States Public Health Association, Columbus, Ohio, April 30, 1956.*



# technical publications

## Diabetes Program Guide

*PHS Publication No. 506. 72 pages. 45 cents.*

State and local workers in diabetes control activities will find in this compact guide a complete presentation of the principles and procedures of community diabetes programs, starting with community resources and proceeding through prevention to case finding, education, evaluation, and research.

Emphasis is placed on testing, with statistical and laboratory procedures treated in some detail.

Criteria of success in diabetes programs are stated as: finding unrecognized diabetics and following them to diagnosis and treatment; helping prevent or correct obesity; helping diabetics control their condition under medical supervision; promoting the understanding of diabetes through individual and group education; and mobilizing community resources.

Included are forms and form letters, seven pages of references, and a detailed section on the cost of screening, with data on both laboratory costs and personnel.

## Your Child from One to Six

*Children's Bureau Publication No. 30. Revised 1956. 110 pages; illustrated. 20 cents.*

This revised bulletin for parents emphasizes the mental and emotional development of children from infancy to school age.

The problem of television viewing is discussed for the first time. Other new sections point out how a child can learn to do without its mother, how to prepare a child for hospitalization, and what to tell a child who asks about death.

A comprehensive medical section tells how to handle emergencies, how

to care for a sick child, and how to prevent and recognize illness. Also provided is a complete immunization plan for children from one month of age throughout childhood.

## Public Health

*Merit Badge Series No. 3251. 1956. Boy Scouts of America. 66 pages; illustrated. 25 cents.*

A new version of this pamphlet has been prepared in association with the Public Health Service. Designed to help Boy Scouts qualify for a merit badge, it is also an elementary introduction to basic concepts and programs of the public health profession.

## Sources of Morbidity Data, Listing Number 4, 1956

*PHS Publication No. 504. 1956. 74 pages.*

The fourth listing of projects in the files of the Clearinghouse on Current Morbidity Statistics Projects contains descriptions of 102 projects, supplementing the 477 described in listings Nos. 1, 2, and 3 (PHS Publications Nos. 322, 399, and 459).

There are three indexes: the projects by type of data collection; the organizations and institutions participating in the projects, by State; and the principal investigators. Also included is a section of supplementary notes representing a systematic followup on projects in the previous listings that were in progress when their descriptions were received by the clearinghouse.

Because the listings of the clearinghouse are published primarily for the use of actual and potential contributors, the number of bound copies available for other distribu-

tion is limited. Tear sheets for all projects are on file, however, and these will be mailed free of charge to persons inquiring about studies of a particular type.

## Federal Support for Science Students in Higher Education, 1954

*National Science Foundation Publication No. 56-18. 33 pages. 30 cents.*

Designed to assist in evaluating proposals for federally financed scholarships in the sciences, this report provides information on present Federal aid to college and university science students.

It shows how much of the expenditure (in the form of fellowships or otherwise) in each program went to students in the various scientific disciplines; how many career science students were assisted; which Federal agencies were involved; how the various forms of financial aid were distributed among those studying in scientific fields; and, how, among the fields of study at graduate level, the federally aided group of science students compares with the nationwide graduate student body in the sciences.

Data on students in nonscience fields are included in the aggregate only for comparison.

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This section carries announcements of all new Public Health Service publications and of selected new publications on health topics prepared by other Federal Government agencies.

Publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication. Public Health Service publications which do not carry price quotations, as well as single sample copies of those for which prices are shown, can be obtained without charge from the Public Inquiries Branch, Public Health Service, Washington 25, D. C.

The Public Health Service does not supply publications issued by other agencies.

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# Film an Educational Aid In New Mexico's Venereal Disease Program

By BERNARD F. ROSENBLUM, M.D., M.P.H.,  
and WILSON A. CORCORAN, B.A.

NEW MEXICO, in 1955, ranked sixth in reported cases of syphilis. For the young age groups, those aged 15 to 25 years, the significance of the venereal disease problem in the State is shown by the figures for that year and for 1954.

For 1955, in the age group 15 to 25, there were 212 cases of syphilis, 797 of gonorrhea, and 9 of chancroid, a total of 1,018 cases of venereal disease of all types. This was 40 percent of the total of 2,609 for the State. For 1954, the total was 2,533 cases, of which 1,108, or 44 percent, were in the group aged 15 to 25 years.

When the film, "The Invader," was shown to the staff of the New Mexico Department of Public Health, it was agreed that here was an excellent film for use in our venereal disease educational program. It was particularly suited to the age groups we wished to reach. The film was previewed at different showings by the New Mexico Parent-Teacher Association officials, the Catholic Archdiocese, and the Ministerial Alliance. All were impressed, and gave their approval and endorsement for "The Invader" to be shown to any and all groups, including public, parochial, and private schools.

A letter was sent to all local school and parent-teacher association officials telling them of the venereal disease conditions in the

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*Dr. Rosenblum and Mr. Corcoran of the Public Health Service Venereal Disease Program are with the New Mexico Department of Public Health, Santa Fe, N. Mex. Dr. Rosenblum is venereal disease control officer and director of the division of preventive medicine. Mr. Corcoran, a health program representative, is also assigned to that division.*

*This paper was presented at the First International Symposium on Venereal Diseases and the Treponematoses, Washington, D. C., May 28-June 1, 1956.*

State and of the proposal to use the film, "The Invader," as an integral part of the health department's approach to the problem. The letter included a short paragraph about the contents of the film and stated that it had been previewed and unanimously approved by the State Parent-Teacher Association, the Catholic Archdiocese, and the Ministerial Alliance. It was suggested that the local parent-teacher association preview the film one evening and present it to the students the following day. A mimeographed list of the 20 questions most commonly asked about venereal disease was enclosed, for presentation to the students prior to their viewing the film. The questions were in a "true or false" form, and the student was not required to sign his name but to give only his age, sex, and grade in school. The letter requested dates and alternate dates of the parent-teacher association meetings.

Response was immediate and overwhelming. The health department was swamped with requests for the film. With only one print on loan from the Venereal Disease Program of the Public Health Service, we were in need of additional prints if we were to carry out the educational program, including the showings of "The Invader," within a 12-month period. One print was purchased, and we prevailed on the Regional Office of the Public Health Service in Dallas, Tex., to lend us another print. With three prints to be divided among a field staff of five, stationed from 200 to 300 miles apart, and the home staff of two, the three films had to be scheduled to arrive at the right time and the right place for a 2-day stay and then be sent to the next showing. Coordinating the logistics on these procedures required the combined efforts of the home and field staffs. Because mail service is often delayed in New Mexico, the prints were sent by public interstate buses. This means of transportation is widely used in New Mexico and offers more frequent and better service to remote areas than do the railroads in transporting mail and freight.

At parent-teacher association meetings, "The Invader" was presented by a member of the health department staff, usually one of the trained venereal disease investigator-interviewers or, rarely, by a public health nurse. The usual procedure was to give a 5-minute

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## "The Invader"

"The Invader" is a film history of syphilis from the Renaissance to the present day. The pictures and text tell of the 400-year search of scientists for a cure for syphilis, of the discovery of penicillin by Fleming in 1928, and of Mahoney's work with penicillin which resulted in the announcement in 1943 that a cure for syphilis had been found. The film also gives an account of the fight for open discussion of syphilis so that syphilitics can be reached and the "chain of infection" broken.

The informative Film Guide for Teachers and Discussion Leaders issued by the division of instruction of the Georgia Department of Education states that the film "leaves the viewer with the feeling that everyone has a part in helping to conquer syphilis" and that "the surest control of syphilis comes from the integrity within that makes a man or woman live by decent values."

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introduction, usually confined to the venereal disease situation in the State, with a few words about the length of the film. The audience was told that a question period would follow the showing of the film.

The following day, when the program was presented to students, usually boys and girls together, the introduction contained the statement that syphilis is a communicable disease and that the program was being presented on that basis and not on the basis of sex education. The students were told that a question and answer period would follow the film and also that the correct answers to the 20 questions distributed earlier would be given. These question lists, which were preferably completed a day or two prior to the showing of the film, were collected by the person showing the film and later were forwarded to the State health department for tabulation. A program has yet to be completed during which the students did not ask questions, such as, "Is there any vaccine for immunity to syphilis?" and, "Can syphilis be inherited?" Almost everyone expressed the opinion that they had learned many things they had not known before, and that they had enjoyed the film.

Some "do's" and "don'ts" may be of value in presenting this film. In making final schedules, make sure that the time does not conflict with a local basketball game, baseball game, or other event, or the program will be presented to an empty hall. When the film is to be shown to several schools in the same community, a local movie theater may be used, thereby saving precious time and personnel. It is wise to carry a projector and a screen and an extra 50 feet of extension cord. Frequently, the projector provided by the school or organization has something wrong with it, and unless a workable projector is on hand, the program will be a failure. Care should be taken to rewind the film after each showing. It is embarrassing to begin a new showing of the film and have to stop and rewind it, thus losing the attention of the audience. When making arrangements to ship the film to another location, the task of transportation should be delegated to a responsible person or the film may be mislaid and delayed, disrupting the schedule.

Through these methods and efforts "The Invader" was shown to 68,229 persons during September 1955-June 1956. The film was seen by the students and faculty of public, parochial, and private junior and senior high schools; civic groups, such as PTA's and miscellaneous clubs; and military personnel, as follows:

	<i>High schools</i>	<i>Civic groups</i>	<i>Military personnel</i>
Attendance-----	33, 791	19, 500	14, 938
Number of groups-----	129	207	5
Number of showings---	273	207	54

The following suggestions may help in planning future programs:

1. The film should be prepared with commentaries in several languages. A Spanish commentary would be useful in New Mexico.

2. If the film could be shortened it could be used advantageously for television showing. It is very difficult and expensive to get television time, and "The Invader" runs 37 minutes, making it awkward to fit the pattern of 30-minute TV programs. A 20-minute showing, with an 8-minute discussion, would make a 30-minute program with 2 minutes for the announcer.

Because of its success in New Mexico, we recommend showing "The Invader" as an integral part of a venereal disease education program.

# Contributions of Premarital and Prenatal Blood Testing in Syphilis Control

By HAROLD J. MAGNUSON, M.D., JAMES F. DONOHUE, M.P.H., JOHANNES STUART, Ph.D.,  
and GERALDINE A. GLEESON, A.B.

MUCH OF THE PROGRESS in syphilis control during recent years has been accomplished through the cooperative efforts of the national venereal disease control program, State and local health departments, and various private agencies. The control measures and techniques used by these health agencies form such a closely integrated system that it is difficult to break down the contributions of certain components or to evaluate the efficiency of specific control measures. However, in this report two segments of the program, namely, premarital and prenatal blood-testing legislation, have been isolated, and an attempt has been made to measure the specific accomplishments of required blood testing.

Aside from the case-finding aspects of required blood-testing programs, the primary purpose of premarital and prenatal blood testing is to preserve the health and welfare of the family unit by preventing the transmission of

syphilis to marital partners and by protecting unborn children from infection with congenital syphilis. Such blood testing also has its educative values.

One of the most immediate results of effective premarital and prenatal blood-testing legislation should be reduction of infant mortality due to syphilis. But since there has been a general downward trend in infant mortality from syphilis during the past 20 years, it is difficult to determine by observation alone whether this reduction in rates would have occurred regardless of blood-testing legislation, or whether there is a definite relationship between the two factors.

In an attempt to distinguish between the reduction in infant mortality due to blood-testing legislation and the general downward trend in infant mortality, composite rates per 1,000 live births for infant deaths due to syphilis were computed for States having prenatal blood-testing laws during 3 years prior to the year the law became effective. Assuming these three yearly rates to be representative of the general trend of infant mortality due to syphilis immediately preceding the passage of the law, a straight line trend ( $a+bx$ ) was fitted to these rates and then extended through 5 years following prenatal legislation. Confidence limits at the 1 percent level of significance were set up about this extended line to allow for chance variation. The actual observed rates were plotted for the 5 years.

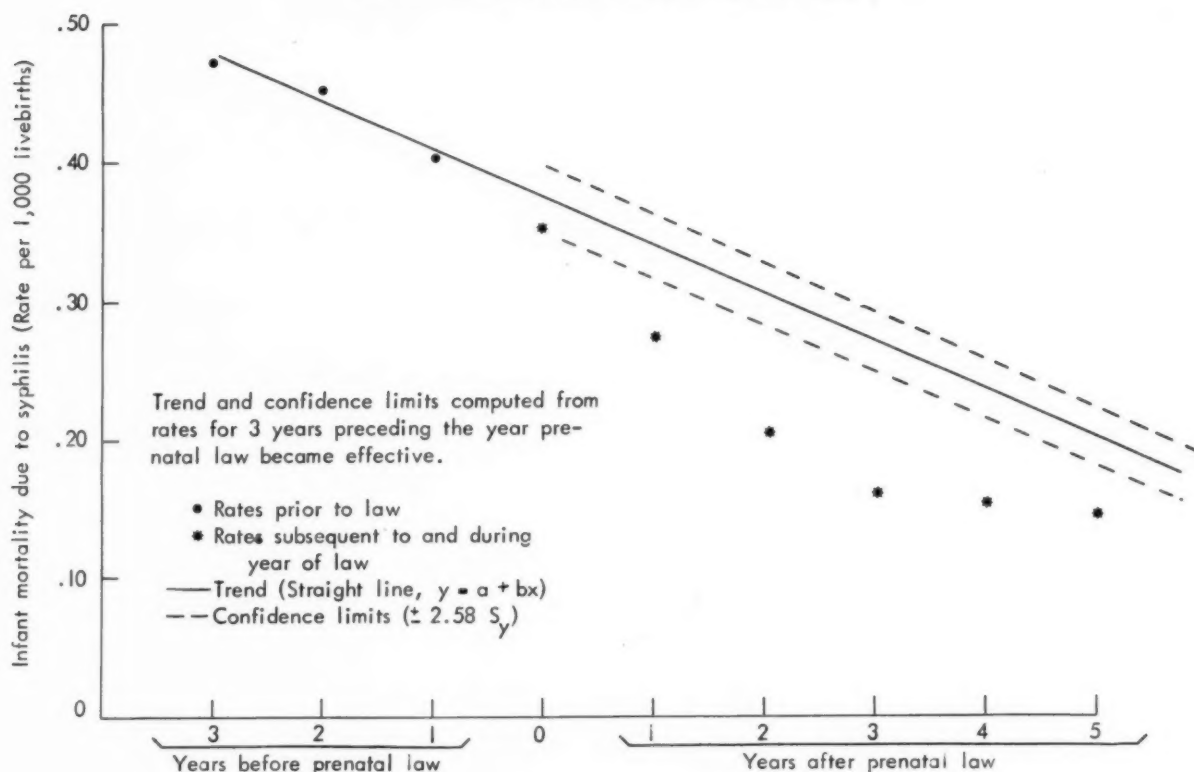
Figure 1 shows that the observed infant mortality rates for all years are significantly lower

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*This paper was presented at the Third Biennial Planning Conference of the Association of State and Territorial Health Directors, Washington, D. C., May 25, 1956.*

**Figure 1. Composite rate of infant mortality due to syphilis in 42 States before and after enactment of prenatal blood-testing law.**



than the expected trend based on rates prior to blood-testing legislation. As a specific contribution to syphilis control, it is estimated that through the effectiveness of prenatal blood testing 1,000 infant deaths from syphilis were prevented in 42 States during the first 5 years following enactment of the law. Since 30 of the 42 States with prenatal blood-testing laws had enacted these laws during 1943, or earlier, the interval represented in the 5-year period is largely coincident with the war years and the immediate postwar years. This reduction in infant mortality due to syphilis becomes even more remarkable in view of the fact that it was accomplished during a period when infectious syphilis case rates among civilians were at a peak and before penicillin became available for civilian use. This points up the vital importance of the operation of required blood-testing programs before, during, and after national crises which boost the rate of venereal disease infection.

The procedure used in evaluating the effectiveness of prenatal blood testing was also

used in examining the efficiency of premarital blood testing. Figure 2 shows that, except for a longer time interval, rates are essentially the same as would be expected before the reduction in infant mortality rates became readily apparent.

#### Prenatal Testing

To investigate the effectiveness of prenatal blood testing in individual States, the trend established by pre-law rates was related to post-law rates in each of the 42 States having prenatal blood-testing legislation. The results were as follows:

1. Fourteen States had an upward trend in infant mortality from syphilis during the 3 years preceding the effective date of the prenatal blood-testing law. After the passage of the law, all of these States had a downward trend in infant mortality from syphilis and experienced significantly lower rates than expected during 5 years following prenatal blood-testing legislation.

2. Two States with a steady level of infant



mortality due to syphilis during the 3 years preceding passage of the prenatal blood-testing law had significantly lower rates than expected during the subsequent 5 years.

3. Twenty-six States had a downward trend of infant mortality due to syphilis during the 3 years preceding prenatal blood-testing legislation. In all of these States the trend in infant mortality due to syphilis continued downward in the years immediately following legislation, in 7 at a faster pace than expected; in 6 at approximately the pace expected; and in 13 at a slower pace than expected.

As an example of the enactment of a prenatal blood-testing law resulting in decreased infant mortality due to syphilis, the observed rates in relation to expected trend are shown in figure 3 for the State of New Mexico. The significant decrease noted during the years 1950-53, following the passage of the law in 1949, is even more remarkable in view of the fact that New Mexico has for some years had the highest rate of infant mortality from all causes in the United States.

It might be asked if the accelerated decrease in infant mortality due to syphilis was confined to States with required prenatal blood-testing legislation or if States without such legislation experienced a comparable reduction in infant mortality rates. Since there is no date of law enactment to use as a point of reference in establishing an expected trend of infant mortality from syphilis in States without prenatal or premarital blood-testing laws, the selection of a year from which to project such a trend becomes fairly subjective. However, the observed trend line for areas without such legislation shows a gradual reduction in infant mortality from syphilis from 1936 to 1950, but how much more of a reduction would have occurred during these years if blood-testing legislation had been in operation is a matter of conjecture.

In addition to the reduction in infant mortality due to syphilis there is evidence to indicate that prenatal blood testing makes a definite contribution to the control of infant mortality from all causes. Presumably this is accomplished by bringing many expectant mothers to prenatal

**Figure 2. Composite rate of infant mortality due to syphilis in 40 States before and after enactment of premarital blood-testing law.**

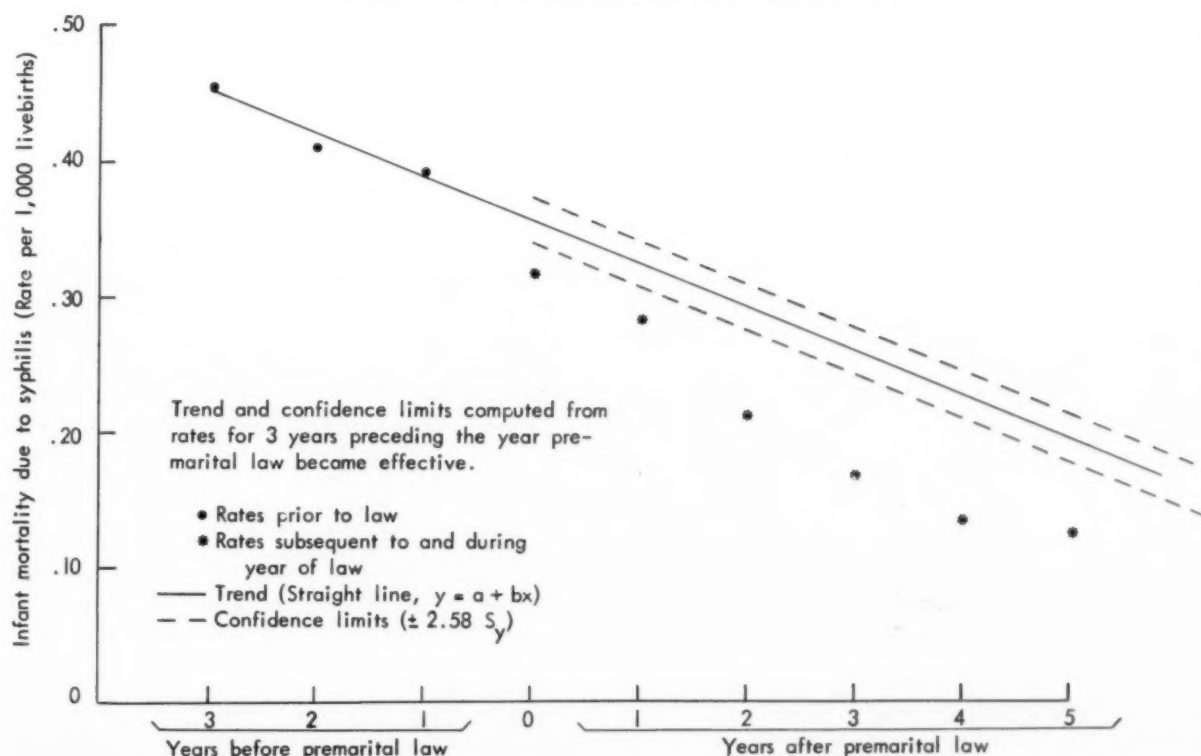
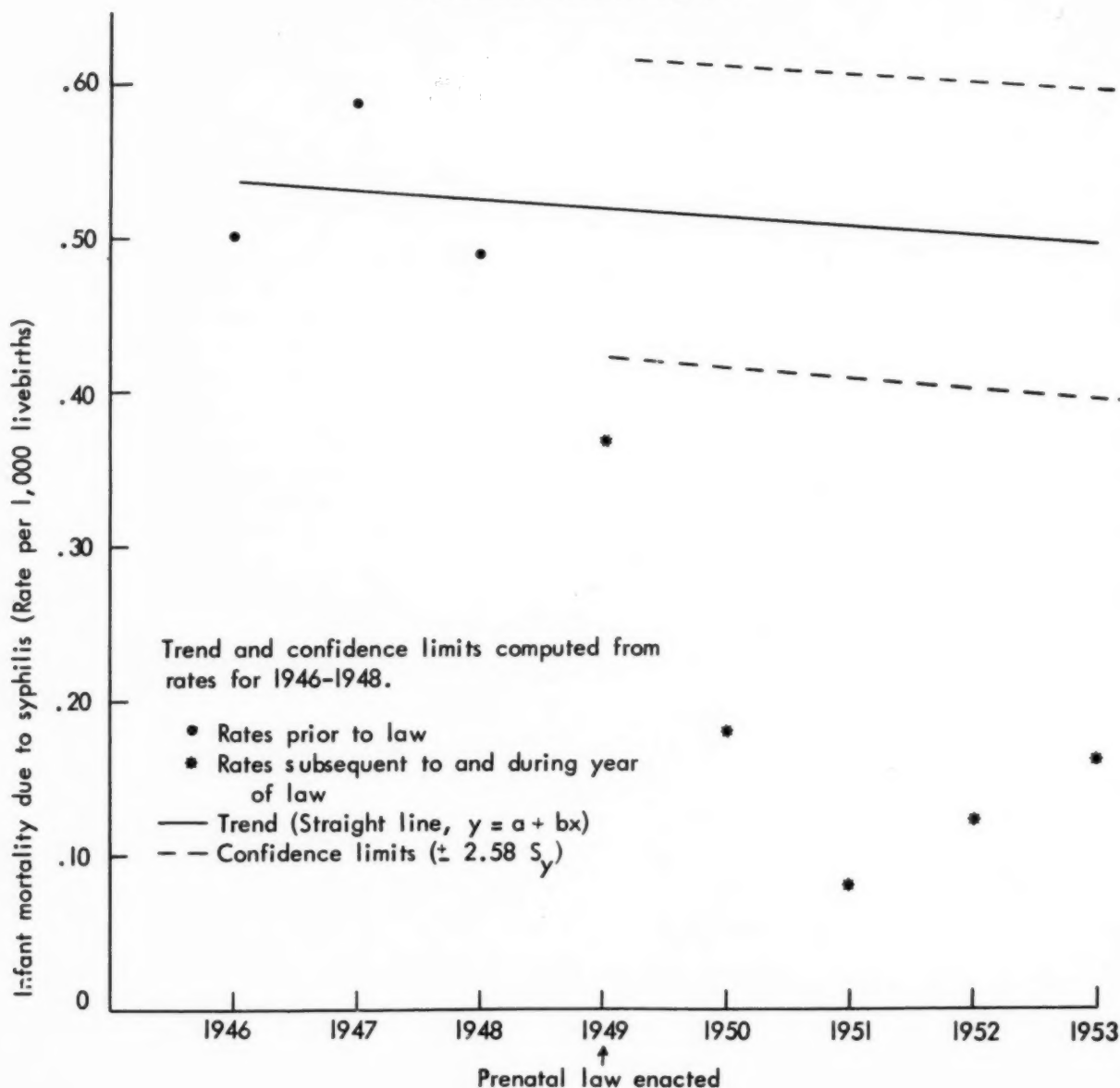


Figure 3. Rate of infant mortality due to syphilis in New Mexico before and after enactment of prenatal blood-testing law.



care which they probably would not obtain otherwise.

For the years 1951-53 the total infant mortality rates were significantly lower in the group of States with prenatal blood-testing laws. Since the States without these laws are not those with unreasonably high infant mortality from causes other than syphilis, it seems reasonable to assume that the lower infant mortality in States with prenatal blood-testing laws may have been due at least in part to increased

prenatal care incident to the required blood-testing program.

#### *Race Distribution*

Race distribution is, of course, a very real factor in measuring infant mortality. To determine the results of prenatal blood testing, specific for race, we have prepared some comparative material on areas with and without the law with varying percentages of white population. The 7 areas without prenatal

laws (6 States and the District of Columbia) happen to cluster in 3 geographic areas where white births comprise the following percentages of total births: 63 percent in Alabama, Tennessee, and Mississippi; 75 percent in the District of Columbia and Maryland; and 98 percent in Minnesota and Wisconsin. Total infant mortality in neighboring States with a prenatal blood-testing law and of a comparable proportion of white births was compared with the total infant mortality in these three areas. In every case, regardless of race distribution, the infant mortality rate among the white population was lower in 1953 in States with the prenatal blood-testing law than in States without such a law. Conversely, in all instances, the nonwhite infant mortality rate was higher in States with the prenatal blood-testing law than in States without this law, with the differential becoming greater as the number of nonwhites in the population decreased.

There may, of course, be a number of factors contributing to this paradox among nonwhites. One factor is the administration of the law. This was borne out by a study of New York City birth certificates which asked whether a prenatal blood test had been made (see table).

**Results of a study on prenatal care in New York City, 1951**

Race	Number of births	Late or no prenatal STS	
		Number	Percent
White.....	4, 905	639	13. 0
Puerto Rican.....	521	228	43. 8
Nonwhite.....	1, 138	441	38. 8

From birth certificate data it was found that in 13 percent of the white births studied, the mother either had no serologic test for syphilis (STS) or had had an STS only during the last trimester of pregnancy, as compared with 44 percent among Puerto Rican and 39 percent among nonwhite pregnant women. If only 60 percent of nonwhite pregnant women are being adequately tested for syphilis in New York City, where a prenatal law has been in effect since 1938 and where medical facilities are known to be available, there is reason to believe

that administration of the prenatal law is even less effective in areas where prenatal care is less adequate. With higher percentages of nonwhites in an area, the administration of the law becomes less effective for this group.

### *Penicillin Therapy*

Another factor which adds to the difficulty of evaluating prenatal blood testing is penicillin therapy. This has undoubtedly affected, even to the point of destroying trend comparability, the two measures we use to estimate the incidence of congenital syphilis, namely, reported number of cases and infant mortality due to syphilis. With penicillin readily available and carrying little therapeutic risk, many physicians have adopted the policy, in cases of doubtful diagnosis, of treating infants on a prophylactic basis. Since these cases are not diagnosed, they are not included in the congenital syphilis case rate. On the other hand, treatment of syphilitic babies with penicillin has been so successful that infant mortality due to syphilis is no longer comparable to this rate during the arsenical-bismuth era. Thus, the reductions in the incidence of congenital syphilis may be due, for the most part, to therapy rather than to the actual prevention of cases. Very recently, with the alarm aroused by increased reactions to penicillin, this therapy is in many cases being withheld, which complicates the trend pictures even more, but at the same time points up the need for prenatal screening.

### *Congenital Syphilis*

Another facet of the evaluation of required blood-testing programs centers on the difficulty of diagnosing congenital syphilis. In infants, there may be no physical signs of the disease, and the serologic test is sometimes negative until 3 or 4 months of age. In present-day venereal disease control programs, many years pass before it is certain that all children at risk have been screened for congenital syphilis. Mass blood-testing programs are designed for those who have reached early adulthood, and we know from experience that very few cases of congenital syphilis are found in blood-testing surveys. Hence, the child with congenital syphilis often remains undiscovered and un-

treated until he enters school, applies for a job, enters military service, or plans to marry. An effective prenatal blood-testing law will protect him from infection before birth. For instance, in the fiscal year 1955, 4.8 percent of the reported cases of congenital syphilis were in infants less than 1 year old at time of discovery of syphilis, 2.2 percent in children aged 1-4 years, 8.1 percent in children aged 5-9, and 85 percent were in children 10 years old or older. In numbers, this means that 4,700 of the 5,515 patients with congenital syphilis reported in fiscal year 1955 were approaching or had reached adulthood before detection of the disease. This number, added to the undiscovered reservoir of cases still in the population, represents, in a measure, the past failures of prenatal blood testing and points up the need for more effective administration of the law.

#### **Premarital Testing**

Reactivity rates in premarital blood testing have not declined in the period 1951-54, the only period for which we have data available. This maintained level of reactivity indicates that whatever reasons there may have been for the original enactment of the laws, these reasons may still be valid. The argument may be raised that premarital blood testing has not discovered an appreciable number of cases of early syphilis; however, it must be kept in mind that premarital blood testing was not expected to find much lesion syphilis. Conservative estimates indicate that 12,000 to 13,000 previously untreated syphilitic persons are found annually through premarital blood testing. Because of the age-interval of candidates for premarital blood testing, most of the cases of syphilis detected are early latent. Our current epidemiological indexes indicate that each person diagnosed with early latent syphilis names, on the average, 2 contacts, and that 115 cases of syphilis per 1,000 of these contacts examined are found as a result of contact interviewing.

Required blood testing has general health educational value. The very fact that it is required by law is convincing proof to many of the efficacy of such a procedure. Very few people submit to premarital or prenatal blood

testing without some notion of why they are being tested. Premarital blood testing, which in most States is incorporated as part of a physical examination, offers the physician opportunities to find lesion syphilis, to do effective case finding of other diseases, and, in some cases, to provide sex education and marriage counseling. Premarital and prenatal blood testing in the control of syphilis are analogous to preventive medicine in other diseases. Since preventive medicine is the very essence of public health, blood-testing legislation is desirable.

As an index of prevalence of syphilis, the need for required blood testing continues. Perhaps of greater importance than as a statistical measure of control, required blood testing screens a segment of the population in which the incidence of early syphilis must be kept at a minimum if venereal disease control is to be maintained. Furthermore, the value of prenatal and premarital blood-testing laws must be measured against the number of cases of syphilis prevented by the existence of these laws as well as in terms of the cases found by their operation.

As a possible example of this dual evaluation of blood-testing laws, 100 cases of early syphilis detected among 100,000 persons examined premaritally would result in an infection rate of only 1 case per 1,000 examined. However, in terms of prevention, the 100 additional new infections which could have developed in prospective marital partners, plus the likely congenital infections in offspring of these marital unions, increase this rate to new proportions. By adding to these infections the previous contacts from which the initial 100 infections were acquired, 1 case actually detected among each 1,000 premarital examinees should be increased to perhaps 5 cases (assuming 2 offspring to each union) to measure more accurately the efficiency of premarital epidemiology and case finding.

#### **Summary**

Premarital and prenatal blood-testing legislation, when properly administered, contributes to venereal disease control by (a) detecting and bringing or returning to treatment persons with syphilis, (b) preventing the transmission of syphilis to marital partners, (c) protecting un-



born children from congenital infection, (d) reducing morbidity and mortality due to syphilis and to other causes among infants by encouraging prenatal care, and (e) providing opportunities for general health education, sex education, and marriage counseling. Despite the accomplishments of required blood-testing

programs during recent years, there remains much to be done toward the prevention and control of congenital syphilis. As long as cases of congenital syphilitic infection continue to be found in our population, there is a definite need for strict enforcement of blood-testing legislation.

## Revised Statement of Rheumatic Fever Prevention

Revised recommendations for preventing first and repeat attacks of rheumatic fever are incorporated in a new edition of the American Heart Association's statement on Prevention of Rheumatic Fever and Bacterial Endocarditis Through Control of Streptococcal Infections.

This is the second revision of the statement, prepared by the AHA Committee on Prevention of Rheumatic Fever and Bacterial Endocarditis to keep pace with the progressively growing body of knowledge and experience in this field. The committee points out that no recommendations can be considered final at this time. Revisions and changes will be made as new knowledge may indicate.

### Principal Changes

Following are the principal changes in the recommendations:

1. Greater emphasis is placed on the value of throat cultures in diagnosing streptococcal infections with a view to stimulating an increased use of cultures, particularly when clinical manifestations alone are inconclusive.

2. The recommended duration of prophylaxis has been qualified. The committee reaffirms its view that continuous prophylaxis should be maintained indefinitely for known rheumatic subjects, but it recognizes that some physicians may wish to make exceptions in certain of their adult patients, particularly those without heart disease who have had no rheumatic attacks for many years.

3. Monthly injection of 1,200,000 units of benzathine penicillin G intramuscularly is now listed first among prophylactic methods. The committee also indicates that it is preferable, if oral penicillin is chosen as the method of prophylaxis, to prescribe 200,000-250,000 units twice daily, rather than once,

providing an additional safeguard against breakthroughs which have been reported with the smaller dosage.

### Bacterial Endocarditis Prophylaxis

Also revised in the statement are the recommended dosages for prophylaxis against bacterial endocarditis in patients with rheumatic or congenital heart disease who are obliged to undergo such surgical procedures as dental extractions and tonsillectomies. Emphasizing that the dosage regimens used for long-term prophylaxis of streptococcal infections are inadequate for this purpose, the committee recommends that high blood levels of penicillin be maintained for several days (rather than, as previously stated, on the day of operation alone) to prevent organisms from lodging in the heart valves during the period of transient bacteremia.

In general, the combined oral and parenteral route of administration is preferred, as follows: oral penicillin (200,000-250,000 units four times a day) for the 2 days before and the 2 days after surgery; the same dosage of oral penicillin on the day of surgery plus 600,000 units of aqueous penicillin with 600,000 units of procaine penicillin shortly before operation. Alternative recommendations are included for situations in which injection is not feasible or penicillin is contraindicated.

The revised statement appears in the December 1956 issue of *Modern Concepts of Cardiovascular Disease* and in the January 1957 issue of *Circulation*. An outline of a recommended method for culturing beta hemolytic streptococci from the throat is also being made available by the association and may be obtained from local heart associations or the American Heart Association, 44 East 23d Street, New York 10, N. Y.

# Serology Control Program Of the Venereal Disease Research Laboratory

By AD HARRIS  
and HILFRED N. BOSSAK, B.S.

THE SEROLOGY CONTROL program of the Venereal Disease Research Laboratory was evolved to assist State laboratories in attaining and maintaining a high level of efficiency in serologic testing. Through these State laboratories, the testing efficiency of all laboratories of this country performing serologic tests for syphilis may be favorably affected. This program has nine integrated segments, each of which is of little value as a separate entity, but which, collectively, have been effective in reaching the objective with a minimal expenditure of time and money. The serology control program has also served as a pattern of operation used by several States as a service to the laboratories within their jurisdictions. Available to the central laboratories of the 48 States, the District of Columbia, Alaska, Hawaii, Puerto Rico, and the Virgin Islands, the services of the program include:

Providing a laboratory manual prepared by the staff of the Venereal Disease Research Laboratory.

Providing reference-standard serologic reagents prepared by the staff of the Venereal Disease Research Laboratory.

Inspecting laboratory serology control programs.

Conducting scheduled training courses.

Conducting field refresher training courses or workshops.

Standardizing and supplying dehydrated control serum.

Conducting hemispherewide serologic evaluation studies on a continuing basis.

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*Mr. Harris is director of and Mr. Bossak is a bacteriologist with the Venereal Disease Research Laboratory, Public Health Service, Chamblee, Ga. Their paper was presented at the First International Symposium on Venereal Diseases and the Treponematoses, Washington, D.C., May 28-June 1, 1956.*

Participating as a control or co-control in intra-state serologic evaluation studies.

Offering a *Treponema pallidum* immobilization (TPI) testing service, nationwide, through the State and Territorial laboratories.

## Manual of Serologic Tests

A Manual of Serologic Tests for Syphilis has been prepared with the assistance of the authors of the tests and is revised at appropriate intervals. The manual contains general information about equipment; cleaning and care of glassware, antigens, and other reagents used in serologic tests; the effect of room temperature on test results; reporting of serologic test results; and laboratory control of test performances. Technique outlines, including recommendations for equipment, glassware, reagents, and step-by-step procedure for APHA reference, Hinton, Kahn, Kline, Kolmer, Mazzini, Rein-Bossak, and VDRL tests, are contained in the 1955 edition (1). Instructions are given in the appendix for the collection and preservation of sheep red cells, preparation and preservation of complement, use of merthiolate as a bacteriostat for spinal fluid, and a recommended method for quantitative determination of spinal fluid protein. This manual has been revised at approximately 5-year intervals in order to stay abreast of acceptable changes in the field of serology. The 1955 edition is the latest revision.

## Services to Laboratories

Standardized antigens and other reagents for the tests listed in the Manual of Serologic Tests for Syphilis are prepared and made available for check-testing purposes to commercial or State laboratories that manufacture or purchase these reagents. During past years, the older type, lipoidal antigens were standardized and distributed for use in check-testing but this activity is now confined to the cardiolipin-type antigens. Verification testing of antigens prepared by State laboratories is also done on request. Agreements have been reached under which samples of VDRL antigen are submitted to the Venereal Disease Research Laboratory for check-testing and approval before sale by commercial laboratories in this country.

State laboratories are visited on request for consultation and for reviewing their serology program (testing, laboratory control, training, and laboratory visitation). Written reports of observations, commendations, and recommended changes, if any, are submitted to the State laboratory director and the State health officer. This service will be more fully described in a later paper.

### Training Courses

Training courses are regularly scheduled at the Venereal Disease Research Laboratory. Nine 2-week courses were scheduled during the fiscal year 1956; 10 courses were held. Applications from this country for these 2-week courses must be signed by the State health officer or the State laboratory director, unless the applicant is an employee of the Public Health Service, in which case the application must be approved by the medical officer in charge of the laboratory where the applicant is employed. Trainees are accepted from Armed Forces installations in this country and from the World Health Organization, the Pan-American Sanitary Bureau, and employees of central laboratories in other countries. Schedules of courses for each fiscal year are distributed before July 1, and reservations are made as soon as applications are received. Application lists are closed 1 month before the dates the courses are to start.

Five courses titled "Serology of Syphilis" were scheduled for the fiscal year beginning July 1956. These courses provide refresher training to senior operating personnel of State and Public Health Service laboratories. They are composed of lecture, demonstration, and participation periods covering the most widely used American methods for the serodiagnosis of syphilis, with references to latest developments in this field.

The two courses in management and control of syphilis serology by the regional laboratory are designed for assistant laboratory directors and senior laboratory staff members and include review of interlaboratory serologic evaluation studies, laboratory inspection procedures, demonstration of antigen check-testing and standardization, and preparation of control serum.

Courses about tests for syphilis using the *Treponema pallidum* include lectures, demonstration of and class participation in the immobilization (TPI), agglutination (TPA), complement-fixation (TPCF), immune-adherence (TPIA), and other tests which use the virulent *Treponema pallidum* as an antigen source. The complexity of these tests requires that these classes be limited to small groups, so it has been necessary to schedule additional classes when large numbers of qualified applicants have applied. Applicants for these courses should have had adequate experience in the field of serology and be in supervisory positions.

Field refresher training courses are also held in cooperation with State department of health laboratories. On-the-job training is also accomplished during visits to Public Health Service laboratory facilities.

### Control Serum

Dehydrated control serum for serologic tests for syphilis is offered to the State laboratories and to Public Health Service laboratories on a continuing basis. Twenty-six ampules of serum, considered to be a 6 months' supply when used at the rate of one ampule per week, are sent with a protocol showing the reactivity of each lot of serum in all of the tests performed at the Venereal Disease Research Laboratory. Continuous use of this control serum will allow the laboratories to determine the relative reactivity of their tests as compared with the same tests performed at the Venereal Disease Research Laboratory and, secondly, will show whether the reactivity of their tests is remaining at a constant level or is varying from day to day. The laboratories that use this serum do not report their findings to the Venereal Disease Research Laboratory, since this is not considered to be an evaluation service.

### Serologic Evaluation Studies

The Public Health Service Serologic Evaluation Study is presently being conducted by distributing 20 samples of prepared sterile serum to each of 62 participating laboratories in each of 10 months of the fiscal year. During



the remaining 2 months, all reports are tabulated and an analysis of comparative results is issued. Laboratories participating in this study during the fiscal year 1956 included the central laboratories of the 48 States, the District of Columbia, Alaska, Puerto Rico, Hawaii, Mexico, and Canada, plus the Kahn, Kline, Kolmer, Hinton, Rein, and Mazzini laboratories and the Venereal Disease Research Laboratory. This type of serologic evaluation study produces data that may be used to ascertain relative efficiency of many laboratory performances of each type or kind of test as compared with the test-author results. In order to make available to the participating laboratories some comparative results before the yearly report is analyzed, a report of the results obtained at the Venereal Disease Research Laboratory each month, with all procedures, is sent to all participating laboratories as soon as their monthly report is received.

A similar, but smaller, serologic evaluation study is presently being conducted for the laboratories of Public Health Service facilities. In this study, 10 samples of prepared serum will be sent monthly for 5 months of this fiscal year to each of 26 Public Health Service laboratories. A report of the results obtained with the VDRL slide test and the Kolmer test at the Venereal Disease Research Laboratory is returned to the laboratories participating in this study as soon as their monthly reports are received.

#### Use of VDRL Services

The central laboratories of all 48 States, the District of Columbia, Alaska, Hawaii, Puerto Rico, and the Virgin Islands have received one or more of the services referred to in this report during the recent past. In the calendar year

1955, these laboratories utilized the services and control functions of the Venereal Disease Research Laboratory 264 times, in addition to submitting 2,875 serums for TPI testing. Additional services were given to the central laboratories of other countries either directly or through the function of the Venereal Disease Research Laboratory as a reference laboratory for the World Health Organization.

#### TPI Testing Service

The *Treponema pallidum* immobilization (TPI) test has been offered since January 1955 as an additional reference service, on a nationwide basis, through the laboratories of State health departments, by the Venereal Disease Research Laboratory. Criteria for acceptance of specimens for this testing are stipulated. Blood specimens are sent to State laboratories, where sterile serum is separated and forwarded to the Venereal Disease Research Laboratory. Each specimen of serum must be accompanied by a completed clinical data sheet containing statements about evidence or history of treponematoses; syphilis in the family; other venereal diseases; record of known STS; diseases other than treponematoses especially those presumed to elicit nonspecific reactions in STS; and the opinion of the attending physician regarding present diagnosis. Reports of TPI tests are sent to the respective State laboratories for forwarding to the submitting physician. During the first months of 1956, requests for this service were received at the rate of approximately 100 per week.

#### REFERENCES

- (1) U. S. Public Health Service: Serologic tests for syphilis. 1955 manual. PHS Pub. No. 411. Washington, D. C., U. S. Government Printing Office, 1955.



# Occupational Health on Farms

By HENRY N. DOYLE

**H**EALTH AGENCIES have many as yet undischarged responsibilities toward rural Americans. To comprehend the responsibilities of official agencies for occupational health on farms, it is useful to grasp the extent of industrialization of American agriculture.

The population of the United States in 1910 was 92 million. Today, it is 166 million, an increase of 80 percent. In 1910 there were 322 million acres of cropland. Today there are 350 million acres of cropland, an increase of only 9 percent. Yet, this acreage produces more than enough food for our expanded population. It is estimated that 310 million acres will supply our 1960 population, thanks to the increase in productivity per acre. Improved soil management, such as erosion control and the use of fertilizers and other agricultural chemicals, including pesticides and weedkillers, have contributed part of this gain. Power machinery has increased the farmer's capacity to plow, sow, harvest, and manage livestock. Furthermore, market crops now grow on about 75 million acres formerly used to grow feed for the horses and mules which have been replaced by power machines.

Mechanization has made it possible for farms to produce more than enough for our present needs through the efforts of only 6,500,000 farm workers, or 11 percent of our working popu-

lation, whereas in 1910, 11,600,000, or 31 percent, were employed in agriculture.

The number of American farms in 1954 was 5,425,000, as compared with about 6,600,000 in 1910. More important, half of our present farms produce nine-tenths of the crops. This concentration offers a striking parallel to many industries in which a small number of large companies account for a high percentage of the total production.

Even as large manufacturing concerns tend, with large-scale operations, to employ the latest advances in mechanization, so, and frequently to a greater degree, large farms tend to employ mechanical equipment. The capital investment associated with many of the new mechanical farm devices often runs to a sum which is not economical for a single-family farm.

Some idea of how mechanization has progressed in farming may be obtained from United States Department of Agriculture statistics which reveal that between 1941 and 1952 the number of tractors increased from 1.7 million to 4.4 million (159 percent), the number of grain combines from 225,000 to 940,000 (318 percent), and the number of mechanical corn-pickers from 120,000 to 635,000 (429 percent). The increase of total power on American farms during that period exceeded 70 percent. Farm output per man now has approximately doubled in the 15 years since Pearl Harbor.

Agricultural changes during the past generation, therefore, have come to create new working conditions even as industrialization changed working conditions in mines and mills.

How do these new conditions affect the health and safety of farm workers? Farming is intrinsically hazardous. Injuries have always been frequent on farms. Although statistical

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*Mr. Doyle is assistant chief of the Occupational Health Program, Public Health Service. His paper and the summaries of the papers on silicosis and X-ray exposure (p. 149) are based on talks delivered to the American Conference of Governmental Industrial Hygienists, Philadelphia, April 21-24, 1956.*

evidence is lacking, experience has led us to expect many injuries from the handling of farm horses. A limited survey in one county within the past 6 months showed that 8 out of 29 recent accidents were associated with horses. Even with mechanization, farmers tend to keep a few horses. Of 44 farms visited in this survey, 36 had at least one horse. The total was 182.

Other farm animals also, particularly bulls, present hazards to farm hands. Injuries from the use of sharp or heavy tools or the stress of heavy lifting also are common farm afflictions, frequently resulting in chronic conditions, herniation, paraplegia, or impairment of vision.

The danger of infections from injuries incurred on the farm must be considered much greater than that in industry. This danger is heightened by the nature of the working environment, the inaccessibility of first-aid facilities, and the absence of interest in giving prompt care to minor wounds and other dermatological conditions. The prevalence of the tetanus hazard on farms is well recognized by physicians, but other organisms also must be considered.

A number of bacterial diseases are associated with agricultural work. Brucellosis, or undulant fever, is thought to be the most common one, but reliable statistics are lacking. It is not likely that all brucellosis is correctly diagnosed or that all diagnosed cases are reported. One factor contributing to the incidence of brucellosis is that rather than call upon a veterinarian, many farmers themselves vaccinate cattle and thereby risk accidental infection. Other diseases of significance on farms include anthrax, erysipeloid, leptospirosis, tularemia, bovine tuberculosis, and various forms of salmonellosis.

By occupation, the farmer is exposed also to viral and rickettsial diseases, including equine encephalomyelitis, psittacosis, Q fever, and Rocky Mountain spotted fever. There is a long list of mycotic diseases, of which actinomycosis and histoplasmosis are examples. A number of parasitic diseases also are potential farm hazards.

Moving from these biological hazards to physical agents, we find that farm work involves exposure to extremes of temperature,

both high and low. Heat exhaustion and heat stroke undoubtedly affect many farm workers. Another condition of possible significance is skin cancer, produced by prolonged exposure to the sun's rays.

The increased use of machines has brought a whole group of hazards new to agriculture. Noise exposures, for example, may now be sufficient to affect the hearing of farmhands who operate machines for extended periods. When more is learned about the problem of vibration, it may also be found to have adverse health effects on agricultural workers. Maintenance and repair work on farm machinery introduce hazards associated with welding.

Accidents incurred in the use of farm machinery represent one of the major categories of farm hazards. Accident rates in agriculture are far above industry as a whole. In 1954 only the mining and construction industries had higher death rates: Agriculture had 60 fatal work accidents per 100,000 (a total of 3,800) as compared with a rate of 25 per 100,000 for all industries. The injury rate, according to the National Safety Council, was 4,930 per 100,000 as compared with 3,240 per 100,000 for all industries.

### **Hazard From Chemicals**

In addition to biological and physical hazards, the industrial hygienist who looks at present-day farming is struck forcibly by the number of toxic chemicals in use. Although many of these are soil conditioners and fertilizers involving little hazard, the majority are insecticides, fungicides, rodenticides, nematocides, and weedkillers which are employed specifically because of their toxic properties. While some are comparatively safe, nearly all present some degree of danger, and some must be classified as extremely hazardous. In particular, the heavy metals, such as lead, arsenic, and mercury, the halogenated hydrocarbons, and the organic phosphates present serious potential dangers to the people using them and sometimes to others working or living in the vicinity.

In dealing with industrial exposure to hazardous materials, we frequently express the view that any material, regardless of toxicity, can be used safely provided that proper

control measures are employed. The same philosophy might be applied to agriculture, but assurance of proper control measures is harder to obtain, at least at the present time. The reasons are apparent. Industrial operations are usually performed in a fixed location where exhaust ventilation or other suitable control methods are feasible. Industry has been subjected to fairly extensive and intensive educational programs on health and safety for at least a generation. Large companies usually have full-time safety and medical departments alert to potential dangers. Furthermore, personnel of insurance carriers and official agencies make frequent visits to industrial plants to check for possible hazards.

On the other hand, agricultural workers generally have little idea of the hazards of handling and applying powerful chemicals. Although most chemicals of this type carry warnings on the container labels, the tendency is to pay little or no attention to the labels, particularly if a material has been used previously without untoward incident.

Moreover, the methods of application are almost as varied as the materials used. Many of these methods present dangers that would not be tolerated in manufacturing establishments. For example, the application of fumigants such as carbon tetrachloride in connection with grain storage may employ techniques that would horrify an industrial hygienist. A recent farm survey observed workers tying handkerchiefs over their faces to protect themselves from heavy concentrations of carbon tetrachloride.

The hazards of farm life are not to be ignored. And they are not ignored although much remains to be done to protect the farmer's health.

### **Health Services for Farm Workers**

Occupational health programs are conducted in official agencies either because of laws specifically concerning industrial working conditions or because of broad powers regarding the protection of health. Virtually all such programs were introduced to cope primarily with problems associated with manufacturing, and, sometimes, also mining. Few

of them gave much thought initially to the farm worker. In recent years, certain State officials have devoted attention to specific farm problems brought to their attention. For example, in Florida, in 1952 there were 46 claims for parathion poisoning filed; in 1953, there were 45. The Florida State division of industrial hygiene has since conducted an educational campaign among citrus grove and truck garden owners on the hazards of insecticides and preventive measures.

Also, California has conducted investigations of the high incidence of occupational disease among its agricultural workers. In 1954, of 23,101 reports of occupational disease in California, 3,143 (13.6 percent) were for agricultural workers.

In addition to purely occupational influences, the health of many farm workers is affected by environmental factors that are much less significant among present-day urban workers. Farm laborers, especially migrant workers, sometimes must live where housing and sanitation levels are far below those now considered as acceptable or safe. Large numbers of workers move from one State to another in pursuit of peak season farm work, and they stop at places where waste disposal is primitive, where water supplies are of questionable quality, where food spoilage is difficult to prevent, and where protection against flies and other disease carriers is absent. With this mobile population, numbering more than the citizens of several States, public health considerations demand far more than control of the traditional occupational diseases. In addition to basic sanitation, there must be answers to knotty questions of medical care for individuals not eligible for service available to permanent residents. Otherwise, it is reasonable to expect that transient workers will be permitted to carry communicable disease to every community that summons their services.

While rural health services can use all available community resources, occupational health personnel must not overlook their special responsibility. Industrial hygienists, in checking the working environment in factories and mines, are also concerned with the water supply, washing facilities, waste disposal, and food sanitation. Nor should they neglect these



points with respect to farm work, or, for that matter, in other situations where rural workers are housed temporarily, as in construction camps. Since such responsibilities also rest upon other personnel in State and local health agencies, policies for the best utilization of available man-hours must be developed to meet the individual situation. It is important, however, to recognize the place of environmental and medical care services in the occupational conditions of agricultural workers.

### **South Dakota and Iowa Programs**

As stated before, a number of State occupational health officials have concerned themselves, to a limited extent, with specific or selected health needs of agricultural workers. To the best of our knowledge, however, no agency has ever considered the total need, with the objective of ascertaining the extent and severity of health problems on the farms of its State. This approach, which has been applied effectively by the States in planning logical and sustained programs for the improvement of worker health in industry, must now be used in agriculture if we are successfully to protect and improve the health of the farm family and its helpers.

The first stirring of activity in this direction came in 1955, when the South Dakota Department of Public Health requested assistance in planning an occupational health program for the State. In response to this request, the Public Health Service suggested that the program be developed to give industry and agriculture equal consideration from the start. To help develop such a program, the Occupational Health Program of the Public Health Service assigned a veterinarian to South Dakota in September 1955. Through this project it is hoped to evaluate the effectiveness of certain

survey techniques and to develop useful information regarding occupational health problems and methods for their attack.

Coincidentally, during 1955 the State University of Iowa Medical School established an Institute of Agricultural Health which will study similar questions in Iowa.

It is significant, we believe, that these related projects were independently conceived and started at this time. Although the existence of health and safety hazards on the farm has been recognized by public health authorities for some years, the South Dakota and Iowa programs represent the first positive steps taken toward a comprehensive approach to the problem.

While some findings from these two States may become available relatively soon, other States need not wait for them before taking stock of the adequacy of their activities with respect to this particular segment of the employed population. Indeed, because of variations in crops, climate, soil, and other factors, problems will be found to differ in each locality, and all States can contribute appreciably to scientific knowledge while carrying out a public health activity of real merit.

The subjects which need exploration are numerous. Study needs to be made of the toxicology and proper application of chemicals, of the safe use of mechanized equipment, of the general health status of agricultural workers as compared with the rest of the population, of the effectiveness of educational measures, and of the availability of health resources.

This is a new and complex field confronting the industrial hygienist. Occupational health needs on the farm may not be readily anticipated, but in every State where agriculture is a significant industry, an earnest beginning should be made to meet this public health responsibility.



## Pediatricians Receive Low X-ray Doses



X-rays as an occupational hazard of physicians have been associated with a relatively high incidence of leukemia in the medical profession.

In an effort to measure the probable routine exposure to radiation of certain specialists in private practice (in contrast to the number of such studies that have been pursued in hospitals), representatives of the Public Health Service arranged to survey the offices of 55 pediatricians in Hamilton County, Ohio.

All but 10 of the physicians used X-ray equipment, mainly for fluoroscopy. The survey was confined to this use. Instruments measured the time the fluoroscopes were in operation for 2 weeks; pocket chambers and film badges determined the exposure of the physicians in the period studied; the team inspected the condition and operation of the equipment; and the medical officer examined the physicians for evidence of gross radiation injury.

The condition of the equipment presented shock hazards, apart from the danger of radiations. Nearly half of the machines were not grounded. Several, thought to be grounded, were not. Also, certain high voltage conductors were exposed.

Scatter or stray radiation at points where the fluoroscopist would be exposed exceeded 50 milliroentgens per minute in 14 instances. Patient's exposure to 6 of the machines exceeded 20 roentgens per minute. Another 16 were above 10 roentgens per minute. The recommended limit is 10 roentgens per minute. For infants and children, it should be much less than that.

The physicians with highest exposures were able to identify and correct errors in procedure.

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*By Peter J. Valaer, B.S., electronics scientist, and Mitchell R. Zavan, M.D., formerly surgeon, Occupational Health Field Headquarters, Public Health Service, Cincinnati. Dr. Zavan is now with Kettering Laboratory, Cincinnati. The full paper is to be published in the American Industrial Hygiene Association Quarterly for March 1957.*

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Three had worn no lead garments. One used a beam of high intensity. Another held the patient, a child, and received high dosage to his arms.

The saving factor in the situation was that more than half of the fluoroscopes were used less than 1½ minutes a week. Consequently, most exposures of physicians were well below present recommended limits.

## Silicosis Prevalence Persists in Industry



Silicosis persists in the United States both as an occupational hazard and as a cause of chronic if not disabling illness among many who were exposed before industrial safeguards had been established. This finding is based on a study of official records from scattered sources, described in some detail at the conference and in other publications.

The study, undertaken by the Division of Special Health Services, Bureau of State Services, Public Health Service, aimed to develop answers to four questions:

1. What is the prevalence of silicosis in the United States?
2. What are the characteristics of the silicotic population?
3. Are a significant number of new cases developing among workers entering dusty trades for the first time in the past 20 years?
4. What aspects of dust exposure need further study?

The findings of the study are to be presented in a special bulletin.

Preliminary observations indicate that the prevalence of silicosis may be several times the number of cases, more than 10,000 that were compensated or reported in one form or another in 22 States in 1950 to 1954, inclusive.

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*By Victoria M. Trasko, program adviser, Occupational Health Field Headquarters, Public Health Service, Cincinnati.*

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Geographic variations in prevalence were affected not only by industrial patterns but also by legal variations. In States where partial disability is compensable, it was to be expected that a relatively greater number of cases would be reported.

A strong indication that the number reported is below the real prevalence figure is found in the fact that in the 5-year period probably 10,000 died from occupational lung disease, but of the more than 10,000 cases reported for this study only 4 of 5 persons are known to have died.

The silicotic patients studied were in the main elderly. Of 4,814 analyzed in all stages of the disease, only 120 were under 35, 1,025 were age 35 to 49, 2,437 were 50 to 64, and 1,232 over 65. In effect, three-fourths were more than 50 years old. But in certain States, depending on the source of information, a much higher proportion of the men were relatively young. This was true especially in eastern States.

These findings provide a partial answer to the third question. Although many cases are the consequence of exposure in days when protective measures were lacking, there are enough young men who must have been exposed in recent years.

The mobility of the working force, with frequent job changes, hinders efforts of the epidem-

ologist to determine which industries are most productive of silicosis, but the highest proportion of cases appear to have been associated with mining, especially coal mining and secondarily metal mining. Of the forms of manufacture associated with silicosis, foundries appear to have been as productive of silicosis as metal mining. This analysis only suggests the most productive sources of the disease, not the relative dangers in the industries concerned.

To judge by the numbers of young men affected, no industry can be certain that it is protecting completely its employees from exposure to dust. Sufficient evidence was uncovered to suggest that either the application of dust control measures is not universal or other factors are involved. The studies suggest that, with relatively light and brief exposures to dust, the disease may take longer to develop than in the past, a possibility that cannot be determined for some years to come.

Such questions warrant further study, especially in view of the rising trend of applications for compensation or public assistance for silicotics. Future studies will be facilitated if diagnosis and reporting improve, if diagnoses and terminology are consistent, and if standards are applied to criteria of disability and to supervised employment of nondisabled silicotics.

## Venereal Disease Course

The 26th Venereal Disease Postgraduate Conference for Physicians, sponsored by the University of Tennessee College of Medicine and the Public Health Service, will be held at the College of Medicine in Memphis, April 18-20, 1957.

The course is designed to acquaint the practitioner with the latest developments in diagnosis, treatment, and management of the venereal diseases. Discussion leaders for the course will be drawn from university faculties, Public Health Service personnel, and other outstanding authorities in the field.

No tuition will be charged. Applications for admission are to be sent to Dr. Henry Packer, Department of Preventive Medicine, University of Tennessee College of Medicine, Memphis 3, Tenn.

# Analyzing the Tuberculosis Case Register

By HERMAN E. WIRTH, M.D., M.P.A., and BEN Z. LOCKE, M.S.

THE FIRST statewide analysis of local tuberculosis case registers in New York State, excluding New York City, was undertaken in 1952. This analysis was based on certain data contained in the registers maintained by 38 city, county, and State health district jurisdictions. The objectives were to determine the number of cases requiring supervision; to study the characteristics of known cases with respect to age, sex, residence, stage of disease, clinical status, sputum status, and type of supervision; and to evaluate the effectiveness of control activities.

The methods used and results obtained were distributed to all full-time health officers concerned and were published in detail (1). Subsequently, regional conferences were held for three major areas, Buffalo, Rochester, and Albany, for the purpose of reviewing the reported findings and of exploring methods for solving the questions raised by the analysis. These regional conferences, consisting mainly of informal roundtable discussions, were attended by regional and local health administrators, tuberculosis hospital directors, supervising public health nurses, program directors, and staff statisticians as well as representatives of local voluntary tuberculosis associations.

In 1955 a second statewide analysis was conducted from February through June to obtain similar data and to determine what changes

had occurred. The second analysis was also desirable to ascertain the indirect effects of the widespread use of antimicrobial drugs, the emergence of treatment plans on a nonhospitalized basis, and the emphasis on resectional surgery. In addition, there was the need to know what administrative steps had been taken locally to provide more and better service, streamline procedures, remove "deadwood" from the registers, and encourage possible savings. Thus, a fourth objective in the 1955 analysis was a review of the epidemiological and administrative changes in the interim period. Certain items of the 1952 analysis were discarded and other more significant ones included. At the time of the second analysis, 40 local agencies were maintaining case registers.

## Administrative Aspects

The value of the case register to administrators depends on the up-to-dateness of entries relating to the persons registered. For the health officer, the register must present the significant facets of the tuberculosis problem in the community if he is to initiate in proper degree those activities needed to resolve the problem. Such activities as case and contact finding, nursing supervision, laboratory and X-ray examination, clinical consultation, treatment, hospitalization, and disposition can only be effectively conducted with the aid of timely data periodically obtained and promptly recorded in adequate detail. This need has been stressed often (2-5).

Of 23,112 cases contained in registers, 4,807 were excluded from the 1955 study because their retention in the visible case registers was not

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**Table 1. Tuberculosis cases excluded from 1952 and 1955 analyses, New York State exclusive of New York City**

Status	1952	1955
Total	4,959	4,807
Inactive, 18 months or more	3,003	2,927
Minimal, arrested 2 years or more	1,141	737
Healed primary	291	478
Healed nonpulmonary	21	137
Suspect	102	328
Dead	401	200

in accordance with the suggested criteria of the New York State Health Department (6-8). Nearly 5,000 such cases had also been excluded from the 1952 analysis (table 1). Thus, there was no significant change despite the fact that removal of the cases would have aided materially in the management of the registers.

Although the health department's criteria for removing cases from the visible registers are not mandatory, their use provides a systematic and standardized approach to related clinical and clerical management problems.

The visible case register, or active file, contains the tuberculosis case and contact register cards on all cases classified as active, arrested, and inactive for less than 18 months among residents of an area administered by a full-time local health officer. The clinical status considered here refers to the 1950 classification of pulmonary tuberculosis of the National Tuberculosis Association.

After excluding these 4,807 cases, 18,305 known tuberculosis patients were recorded as requiring active medical and nursing supervision compared with 19,923 patients in 1952. Thus, the rate per 1,000 population of 2.4 in 1955 as compared with the 2.8 in 1952 represents a decrease of only 14 percent. The rate per 1,000 population in 1955 ranged from a low of 0.8 in Allegany County to a high of 6.2 in Franklin County. In 1952 the rate varied from 0.9 for Schuyler County to 9.9 for Franklin.

In contrast, between 1951 and 1954, the years that best compare with the years in which the data on the case registers were collected, the death rate fell 53 percent and the newly reported case rate fell 26 percent. It is thus apparent that, as the emphasis on new cases is

shifted to all known cases requiring active care, the need for medical facilities, care, and supervision still definitely exists.

### Prevalence

The prevalence of known tuberculosis throughout New York State, except New York City, is determined from the visible registers (active files) of the local health offices. Actually, many persons with known disease do not constitute public health hazards and consequently should be withdrawn from the active registers although they may be under the care of a clinic or private physician. Conversely, there are as yet thousands of undetected cases subject to case-finding activities.

Nevertheless, the visible registers in the local health offices provide a count of the tuberculosis cases classified as known cases significant for public health supervision.

No consequential change occurred in the percentage distribution of the various types of tuberculosis in the 3 years that had elapsed since the first analysis (table 2). Each category showed a small decrease in number, the aggregate being 1,618. As previously noted, the known prevalence rate per 1,000 population decreased from 2.8 to 2.4.

There were some minor changes in the percentage distribution by stage of disease of pulmonary cases (table 3).

When the 1952 analysis was presented it was stated, "it is apparent that, with approximately 13,000 known pulmonary cases in the moderately and far advanced stages, tuberculosis in upstate New York requires continued efforts

**Table 2. Number and percent of tuberculosis cases in visible registers by type, 1952 and 1955, New York State exclusive of New York City**

Tuberculosis type	1952		1955	
	Number	Percent	Number	Percent
All types	19,923	100.0	18,305	100.0
Pulmonary	18,118	90.9	16,692	91.2
Other respiratory	938	4.7	843	4.6
Other forms	867	4.4	770	4.2



**Table 3. Comparison of 1952 and 1955 percentage distributions of pulmonary tuberculosis cases, by stage of disease, New York State exclusive of New York City**

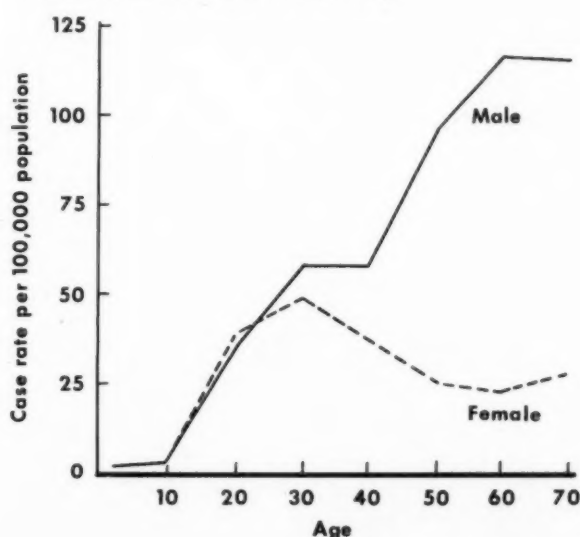
Stage of disease	1952		1955	
	Number	Percent	Number	Percent
All stages	18, 118	100. 0	16, 692	100. 0
Minimal	4, 715	26. 0	4, 068	24. 4
Moderately advanced	7, 623	42. 1	7, 190	43. 1
Far advanced	5, 059	27. 9	5, 053	30. 3
Not stated	721	4. 0	381	2. 3

by all concerned with public health" (1). The only change needed to make this statement applicable to the 1955 analysis is to note that the number of cases is now only 500 less.

The 1955 analysis reemphasized that the tuberculosis problem is greatest among men, particularly those in the older age group. Males constituted 58 percent of the registered pulmonary cases in 1952 (9) and 62 percent in 1955. The number of males registered as tuberculous remained nearly the same. The rate per 1,000 population was 2.9 for males as compared with 1.8 for females.

The 1955 prevalence rate for women reached a peak at 30 years of age, at which point it was

**Figure 1. Rates for newly reported pulmonary tuberculosis cases, 1954, New York State exclusive of New York City.**



only slightly higher than the rate for men. The male rate rose to a peak at 60 years. These findings are similar to those of 1952 (9). The configuration of the 1955 prevalence rates was also similar to that of the newly reported pulmonary tuberculosis case rates for 1954 (fig. 1). Of 16,692 persons with pulmonary tuberculosis, only 126 were under 15 years of age.

The 1955 review of the registers also showed that far advanced cases accounted for 34 percent of the pulmonary tuberculosis among males as compared with 25 percent for females.

The men with tuberculosis are about 10 years older than the women, and persons with minimal extent are younger than those with advanced disease (table 4).

These findings substantiate data from other sources and point up the need for continued

**Table 4. Median age of pulmonary tuberculosis cases, by sex and stage of disease, 1952 and 1955, New York State exclusive of New York City**

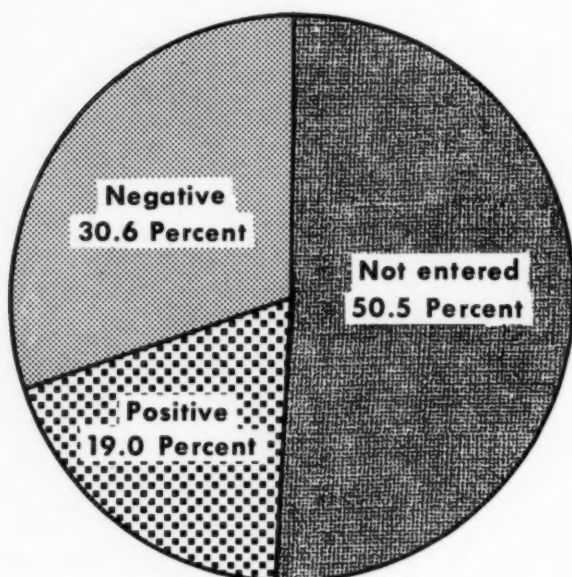
Stage of disease	Median age in years			
	Male		Female	
	1952	1955	1952	1955
All stages	48. 4	50. 0	38. 2	39. 0
Minimal	45. 8	45. 7	36. 1	35. 6
Moderately advanced	49. 0	50. 4	39. 0	40. 1
Far advanced	49. 9	51. 4	38. 8	40. 2

and increased case-finding activities among men aged 45 or over.

#### Sputum Status

Of the 16,692 pulmonary cases on the local tuberculosis case registers in 1955, 3,166, or 19 percent, had a positive sputum in the previous 12-month period. During this same period, however, no sputum information was reported for 8,245 cases, or 50 percent (fig. 2). The percentage of cases with no sputum examinations was only slightly less than in 1952. Sputum examinations represent one of the most important items in case and contact supervision. Since facilities are available, greater

**Figure 2. Sputum status of pulmonary tuberculosis cases, 1955, New York State exclusive of New York City.**



effort to obtain sputum examinations and record the results are indicated.

Of 7,173 active or sputum positive pulmonary tuberculosis cases, less than half were hospitalized in 1955 (table 5). This is similar to the situation in 1952. Only slightly more than half of the 3,166 cases with positive sputum in the previous 12 months were hospitalized, practically no change since 1952. Is it not foolhardy to be complacent about tuberculosis while 3,740 patients who are either active or sputum positive, or both, remain unhospitalized where hos-

pital facilities are available? Of the 1,475 nonhospitalized sputum positive cases, 325 have never been hospitalized for tuberculosis. Nearly 300 of those hospitalized were treated for less than 6 months in hospitals.

As was pointed out in the 1952 analysis, "For many reasons, some more valid than others, it is difficult to hospitalize and keep hospitalized every case requiring hospitalization. Nevertheless, these reasons should be known and recorded and the number of cases in this category reduced for the welfare of the individual as well as that of the community" (10). It must be constantly remembered that these patients, even if under supervision, constitute a potential health hazard.

Nearly 1,000 active cases have no known medical supervision (fig. 3). Such cases certainly constitute a challenge in the control of tuberculosis. Systematic conference-type review of these cases by the local health officer, the clinician, and the supervising public health nurse could very well result in a significant reduction in the number of unsupervised cases.

#### Clinical Status

The clinical status, or activity at time of last report, of the 16,692 pulmonary cases in the active files is shown in figure 4. There were changes between 1952 and 1955, namely, a decrease in the percentage of "active" and "activity not stated" categories. Nevertheless, the clinical status of more than 3,000 cases was not stated or was undetermined.

**Table 5. Sputum positive<sup>1</sup> and other active pulmonary cases, by hospitalization status, 1955, New York State exclusive of New York City**

Sputum and clinical status	Number			Percent in hospital
	Total	In hospital <sup>2</sup>	Not in hospital	
All cases	7, 173	3, 433	3, 740	47. 9
Sputum positive in past 12 months	3, 166	1, 691	1, 475	53. 4
Active	2, 413	1, 548	865	64. 2
Arrested	341	24	317	7. 0
Inactive	117	6	111	5. 1
Not stated or undetermined	295	113	182	38. 3
Sputum negative or no expectoration, active status	1, 024	369	655	36. 0
Sputum not examined or no information, active status	2, 983	1, 373	1, 610	46. 0

<sup>1</sup> Cases classified as arrested or inactive may have positive sputum.

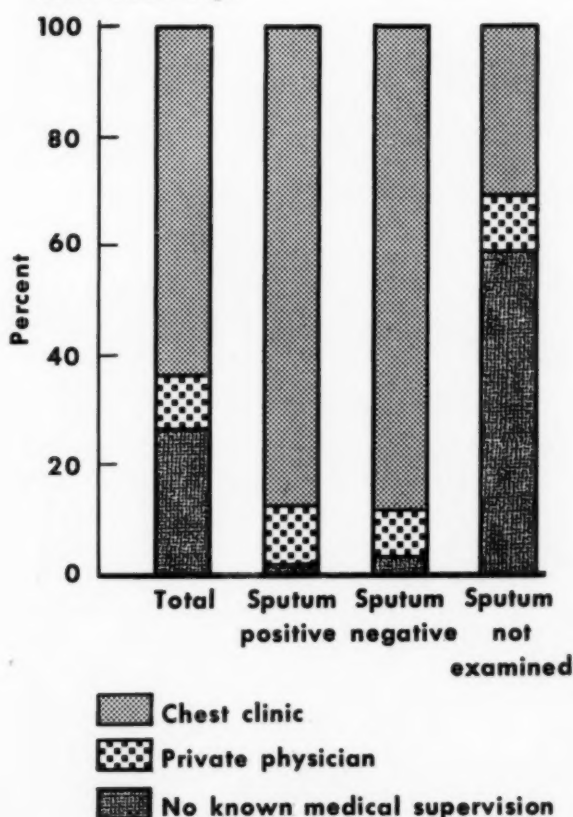
<sup>2</sup> Bacteriological status at time of admission.

Knowledge of the clinical status of cases is not merely of academic interest but has definite administrative value. Clinical status, in addition to the stage of disease, laboratory findings, family conditions, and so forth, determines the amount of supervision the patient and his contacts require. During 1955, 107,406 public health nursing and bedside visits were made to tuberculosis patients and contacts, representing 14.6 percent of the total visits (11). With nursing time at a premium, an up-to-date register will enable the health officer to use nursing service more effectively and economically.

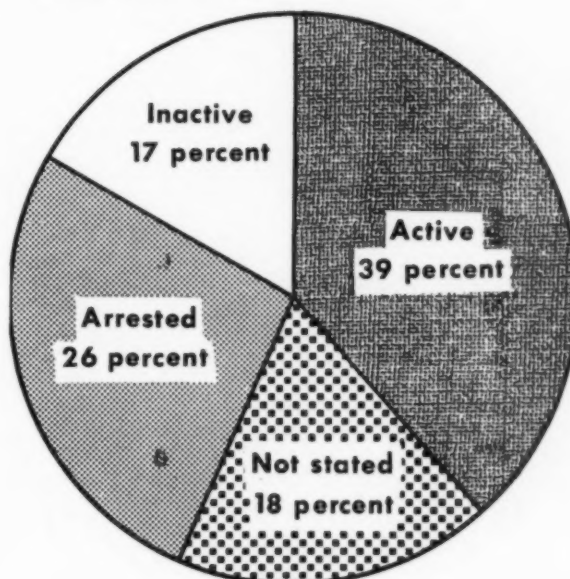
#### Hospitalization Status

With regard to the pulmonary cases classified by clinical and hospitalization status, the findings are not too dissimilar to those of 1952 (table 6). About one-quarter were hospitalized; of the active pulmonary cases slightly

**Figure 3. Sputum positive and other active pulmonary tuberculosis cases not in hospital, 1955, New York State exclusive of New York City.**



**Figure 4. Clinical status of pulmonary tuberculosis cases, 1955, New York State exclusive of New York City.**



more than one-half were hospitalized. Of the nonhospitalized cases 25 percent were classified as active, 33 percent as arrested, 22 percent as inactive, and 20 percent not stated. Between 1952 and 1955 there was a decrease in the percentage of "active" and "activity not stated" groups. Nevertheless, the clinical status of nearly 2,500 nonhospitalized pulmonary cases was undetermined or not stated. Of these patients more than half were under chest clinic supervision and another 10 percent under the care of private physicians (fig. 5). It is recognized that there are delays in determining a patient's clinical status, but prolonged delays affect administrative decisions concerning contact examinations and nursing supervision. When such data are available and yet not entered on the visible register, the value of the register is vitiated.

Nearly 3,000 of the 12,585 nonhospitalized pulmonary cases were under no known medical supervision. About one-third of the 3,130 nonhospitalized pulmonary cases with active tuberculosis were under no known medical supervision (fig. 5). Since, by definition, a person on the register is in need of medical supervision, such unsupervised persons jeopardize their cure and rehabilitation and are potential spreaders of the disease.

Of 13,911 nonhospitalized cases of tubercu-

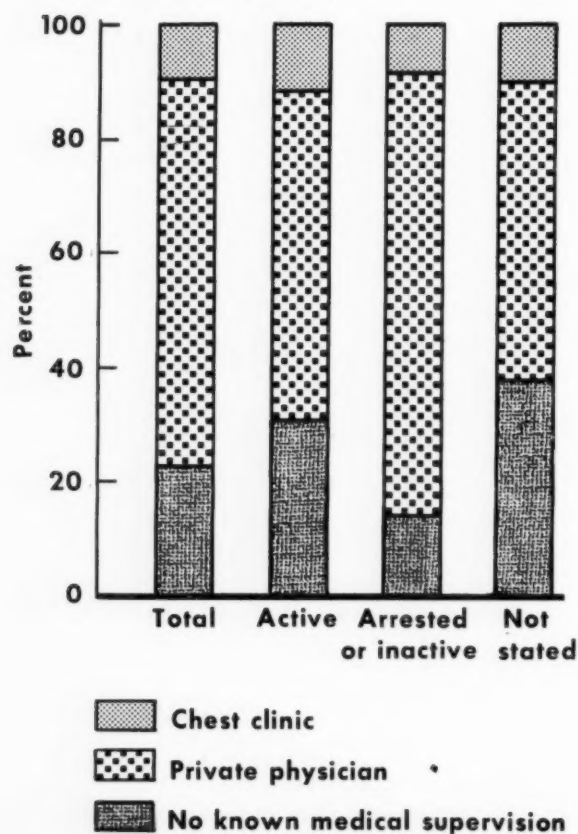


**Table 6. Pulmonary cases, by clinical and hospitalization status, 1955, New York State, exclusive of New York City**

Clinical status	Number			Percent by hospital status			Percent by clinical status		
	Total	In hospital	Not in hospital	Total	In hospital	Not in hospital	Total	In hospital	Not in hospital
Total.....	16,692	4,107	12,585	100.0	24.6	75.4	100.0	100.0	100.0
Active.....	6,420	3,290	3,130	100.0	51.2	48.8	38.4	80.1	24.9
Arrested.....	4,336	132	4,204	100.0	3.0	97.0	26.0	3.2	33.4
Inactive.....	2,852	69	2,783	100.0	2.4	97.6	17.1	1.7	22.1
Not stated or undetermined.....	3,084	616	2,468	100.0	20.0	80.0	18.5	15.0	19.6

losis (all forms) 2,451 had not been clinically observed since 1952 (table 7). From such a large number of nonhospitalized cases, many of them active, and the large group of unsupervised cases, there arises the stark realization that much more remains to be done before

**Figure 5. Clinical status and type of supervision of pulmonary tuberculosis cases not in hospital, 1955, New York State exclusive of New York City.**



tuberculosis may be considered as completely controlled, much less eradicated.

Many of the patients not heard from for 12 months or more, and possibly even some with more recent cases, have undoubtedly moved away, died (without mention of tuberculosis on the death certificate), become lost, or have had inactive tuberculosis for the time period specified for transference from the administratively active file to the closed file. Some patients, despite positive sputum, may be considered as having attained maximum hospital benefit. And, of course, hospitalized patients on weekend passes with the extensive liberty to associate with such susceptible groups as young children may truly be more of a hazard than some nonhospitalized patients who are effectively isolated by geographic, economic, and social conditions.

Even so, substantial numbers of the supposedly known cases undoubtedly still have tuberculosis which has not been completely inactivated. In the light of new therapeutic approaches and surgical skills, many of them

**Table 7. Year of last clinical observation of nonhospitalized tuberculosis cases, 1955, New York State exclusive of New York City**

Year	Number	Percent
Total.....	13,911	100.0
1954-55.....	9,982	71.8
1953.....	1,478	10.6
1952.....	788	5.7
1951.....	501	3.6
1950.....	338	2.4
Before 1950.....	824	5.9



could, it seems, after proper supervision, attain inactive status and erase a community hazard as well as an economic problem.

Tuberculosis is still a costly disease both in lives and money despite the declining mortality and morbidity rates. The number of newly reported cases, as well as the number of significant cases in the registers, indicates that further efforts are vital if effective tuberculosis control is to be accomplished.

Periodic case register analysis contributes to this goal since it helps to sharpen the focus on tuberculosis and pinpoints the problem of the disease as it now exists in each city and county. As each case on the register is reviewed the unsolved problems and vagaries, as they appear to exist for each individual patient, may be further defined. Through such action, specific steps may be taken to provide the necessary social services as well as public health and clinical supervision.

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- (11) New York State Health Department, Bureau of Public Health Nursing: Quarterly report, December 1955. Albany, 1956.

## Richardson Appointed Assistant Secretary

**Elliot Lee Richardson** was sworn in as Assistant Secretary of Health, Education, and Welfare on January 1, 1957, replacing Roswell B. Perkins, who resigned.

Mr. Richardson's duties involve assistance in the development and coordination of the Department's programs, especially in the field of legislation.

Prior to his appointment, which is subject to United States Senate confirmation, the new Assistant Secretary was associated with a Boston law firm. He was assistant to Senator Saltonstall of Massachusetts in 1953-54, and occasionally during the past 2 years he served

as consultant to Governor Herter and Lieutenant Governor Whittier of Massachusetts.

Following his graduation from Harvard Law School in 1947, Mr. Richardson served as a law clerk to Judge Learned Hand in 1947-48 and during the next 2 years as a law clerk to Justice Felix Frankfurter.

Mr. Richardson is a director of the Executive Committee of the Salzburg Seminar in American Studies, a trustee of Radcliffe College, and secretary of the Massachusetts General Hospital as well as secretary, ex-officio, of its board of trustees.



# INTERNATIONAL MAIL POUCH

*These paragraphs, based on overseas reports from public health personnel with missions and field parties of the International Cooperation Administration, give a glimpse into health work abroad. The original material appears in an administrative publication distributed by the Public Health Division of the ICA.*

## **Border Conference**

Thailand and Burma, at Chieng-mai in August 1956, held the first conference in Southeast Asia on antimalaria activities along a common border. Delegates found that antimalaria activities are quite similar in the two countries. The Thailand program has surveys under way to complete border coverage, but the Burma program, in much earlier stages, has yet to gain the cooperation of tribes in remote areas along the border.

The conference recommended that the two countries coordinate antimalaria activities and that Burma, if unable to reach all malarious areas along the border immediately, give priority to operations at some 10 focal points of cross-border traffic.

—ROBERT L. ZOBEL, M.D., *chief, Health and Sanitation Division, United States Operations Mission, Thailand.*

## **Israel Stresses Prevention**

A rectangular, prefabricated building houses the newly opened Kiryat Shmone Health Center built by the Israeli Government. The center provides family health services, both preventive and curative, to approximately 18,000 people in Kiryat Shmone and in outlying settlements and *kibbutzim*. Mostly new immigrants, the residents of Kiryat Shmone represent some six ethnic groups with different cultural patterns.

Within the center are 18 hospital beds, 6 for obstetrical patients, 6 for pediatric patients, and 3 beds each for adult male and female patients. Four

public health nurses offer consultation and advice and engage in case finding. A pediatrician heads a maternal and child welfare subcenter. An anthropologist, studying differing ethnic patterns, meets regularly with the staff. A health educator is conducting a program of public health education and is planning inservice courses for the professional staff.

—JACOB H. LANDES, M.D., *acting chief, Health and Sanitation Division, United States Operations Mission, Israel.*

## **Elephant Express**

To visit the Mnongs and Jarais of Vietnam, you ride an elephant over unmarked trails, or walk. When rivers must be crossed, the choice is between the river and the elephant. There are no maps.

First, you go to Ban Don, by jeep from Ban Me Thuot, over 50 kilometers of dust, mud, and bumps. At Ban Don, you look for the man who will provide you with seven elephants, each with a driver and a helper. You also take a guide. Ours was Leslie Smith, a professional hunter, who interpreted for us, too, but he did not know the country, as it has little game and he had not entered it before. Fortunately, we also had a local guide.

We were the first non-Asians to enter the area in the past 3 years. In the past it had been visited but rarely by French hunters, scientists, and missionaries. Dr. George J. Stein and I were the first Americans, so far as we could learn, and the first malaria control team of any nationality.

One of our malaria control technicians, Y. Khuinh, fortunately was a member of one of the local mountain tribes, and was able to negotiate for us. He was a good assistant and conversant with our aims. We might have been handicapped by intertribal conflicts if we had had an assistant from the wrong tribe. But Y. Khuinh and Y. Suah, both Rhadia tribesmen in Ban Me Thuot who have been trained in malaria control in Taiwan, can assist

future work in this district. They also know French, but not English.

We slept in bedding rolls in temporary camps in the open jungle where there was a stream, or in the houses offered by the tribes. In a tour of about 150 kilometers, we visited three villages: all we could find by inquiry and travel. These were Bon Drang Phok (pop. 85); Ba Ya Soup I (pop. 180); and Ba Ya Soup II (pop. 120). There are no doctors or first-aid stations. The tribes were always friendly and cooperated freely except when Dr. Stein tried to obtain 20 cc. of blood for a serologic study. He was able to persuade only 6 donors. I obtained 236 blood smears and examined 232 spleens.

The isolation of these tribes offers excellent opportunities for public health research and action. Liberal and regular use of an antimalarial drug for 2 or 3 years might be directed at eradicating the malaria parasite here. For example, here Y. Khuinh and Y. Suah can go into the region by elephant, remain 1 or 2 weeks at a time, and inform the chief of each village who should have prophylactic doses and who should have curative doses. They can bring in a 6-month supply of antimalarial drugs, enough to last until they make a return visit to take blood smears and prescribe further treatment. The villagers have seemed quite cooperative about taking the drugs. An alternative or supplement to the administration of drugs is to carry in dieltrin and DDT by elephant for spraying villages. Three villages can be treated with 14 pounds of 50 percent wettable dieltrin.

—HARRY S. STAGE, *formerly malaria and vector control adviser, United States Operations Mission, Vietnam.*

### **Do It Yourself**

The environmental sanitation project in rural villages in the coastal area of Ecuador is progressively organizing communities, conducting sanitary surveys, and constructing demonstration wells and privies. Approximately 50 percent of the householders are building sanitary privies at their own expense. Many requested to purchase sanitary privy slabs available through the missions.

—JAMES D. CALDWELL, *chief, health, welfare, and housing field party, United States Operations Mission, Ecuador.*

### **The Two R's**

The requests of patients at the National Psychiatric Hospital of Panama for help in learning to read and write led to a forward step in the direction of therapy and rehabilitation. The chief of the occupational therapy department persuaded the Ministry of Education to assign a teacher to hold classes for all interested patients at the hospital. The classes meet under a large shady tree because there are no classroom facilities.

—J. G. TOWNSEND, M.D., *chief, health, welfare, and housing field party, United States Operations Mission, Panama.*

### **Baby Clinics Popular in Surinam**

In Republiek, the center of three Surinam communities, including Vier Kinderen and Bersaba, mothers cleaned and prepared the Train Service Building so that we could establish a consultation bureau for their infants and toddlers. Fifty-six babies were brought by mothers to the first clinic. At the second clinic, 4 weeks later, 162 infants and preschool children were seen.

—W. ALAN LAFLIN, *director, United States Operations Mission, Surinam.*

### **Point Four**

The Director of the Ministry of Health, the Governor of Isfahan, and a few leading physicians of the city visited a class for untrained midwives in one of Iran's village health centers. The visitors were told to ask the midwives any question they pleased. One of the physicians pointed a finger at an elderly midwife and said, "What would you do in a delivery if the baby's feet came first?" The old village midwife looked at him and said, "I would call a doctor."

It was in this same village that the Governor of Isfahan asked the *kathodah* (village mayor), "What advantages have you seen from having the public health people work in your village?" The *kathodah* replied, "Your Excellency, dear Sir, we have had no deaths in our village for over a year."

—HELEN J. BAKHTIAR, R.N., *regional public health nurse, United States Operations Mission, Iran.*

# FORMS

## and FUNCTIONS

By CHARLES L. WILBAR, JR., M.D.

IS THERE any public health worker who has not said, at least to himself: Is this form that is being filled out for the department of health really useful? Does it give the data that are sought? Are the data being put to good use? Are the statements on the form so clear that the various people filling it out readily understand what information is desired?

The time spent in compiling and completing the various forms used by any public health agency is considerable. Consequently, having forms carefully designed to obtain specific data is an important factor in the efficient operation of the agency.

Perhaps there is no such thing as a faultless form. However, during the past 3 years the Pennsylvania Department of Health has been working toward that goal. It is certainly not the first health agency to be concerned with improvement of forms, but some of the methods

used and the results obtained may be unusual enough to be of interest to other public health agencies.

### Review and Study

In August 1953, the State health officer of Pennsylvania appointed a Committee on Records and Forms, comprised of top administrators from several units of the department of health. The deputy health officer was appointed chairman. Other members were the director of the bureau of statistics and records, the director of the bureau of tuberculosis, the assistant director of the bureau of sanitary engineering, the chief of the division of biologicals and supplies, and a regional public health nursing consultant. After the first year, a procedure analyst, the first to be employed by the department, joined the committee and became a key person in its activities. (The department now employs three procedure analysts.)

During the first year, the committee began to review in detail all forms used in the department and all new forms proposed. It met once each week. Unit directors were present when the forms for their units were being reviewed.

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*Dr. Wilbar is the deputy secretary of health, Pennsylvania Department of Health, Harrisburg. During the 1940's and 1950's, he was with the Hawaii Department of Health, first as chief of the bureau of maternal and child health and then as president of the Board of Health.*



At first, some of the unit directors felt that the questions asked by the committee were inquisitorial, but, as the results of the committee's work became apparent, a rather general appreciation of its ends developed and the means to those ends became more acceptable.

A form entitled "Request for Form Approval" was instituted and required as an accompaniment of all orders for forms, either new forms or old ones. After the procedure analyst joined the committee, he reviewed the forms of the department which had not yet been covered, conferred directly with the unit administrators concerned, suggested changes where necessary, and then reported back to the committee. This meant that the committee had less detail to consider and therefore needed to meet less frequently. It now meets monthly.

At its first meeting the committee adopted the following definition of a form: any printed or otherwise reproduced record on which there is space provided for the insertion of pertinent data which is repeatedly used by the State department of health or any of its units. Thus pamphlets, posters, and other health education literature were considered outside the jurisdiction of the committee.

The committee set up certain standards for all forms, including paper specifications, uniform department headings, volume of storage supply, and a numbering system. Form numbers are assigned by the supply unit of the department. The supply unit maintains a general register of all forms, and each major unit of the department maintains a register for the forms it uses.

Since any change in procedure is bound to cause a "raising of eyebrows," if not a "throwing up of hands," the committee has attempted from time to time to acquaint the departmental staff not only with its actions but also with the reasons therefor. Records and forms have been discussed at several of the monthly meetings of the department's administrative staff, and one of these meetings was given over almost entirely to the subject. Circular letters have been distributed as the need for them became apparent. Unit directors who have any suggestions or complaints are always welcome to attend the committee meetings.

### The Committee's Accomplishments

As a result of the committee's work, there has been a marked reduction in the number of forms used by the department of health. For example, in one bureau the number has been decreased from 396 to 186.

A considerable reduction in the cost of printing some forms has been achieved. The cost of reproducing one form, for example, was reduced from \$4,800 to \$2,500 for a year's supply. Savings in cost have been brought about by reducing paper volume of some forms, by ordering in quantities that permit the greatest savings without overstocking, and by multilithing instead of printing or mimeographing certain forms. Reduction in paper volume has been achieved by improving format and sometimes by omitting unnecessary items.

Some standardization and integration of forms has been accomplished. The diversity of headings once found on the department's forms and stationery has largely been eliminated. Forms used for similar purposes now have similar design. They may not be exactly the same in content, but their similarity of arrangement makes it much easier than before to fill out the various forms. For instance, forms used in different clinics formerly had similar items scattered in different places. Now there is more uniformity of arrangement, making the task of the public health nurse working in the various clinics much easier.

Probably the most significant accomplishment of the committee has been its demonstration to administrators in the department of the value of good records and of the relationship of records and forms to the philosophy and formulation of program direction. It has become apparent to most administrators that poorly designed forms can waste both time and money. The move toward uniformity of forms has made administrators more aware of the problems faced by other units of the department and the way the various programs mesh into the whole program of the department.

The establishment of a stocking procedure for forms, according to an approved plan, has seemed to add to the efficiency of the department. In the past some forms had been printed in quantities which, at the rate of usage, would last many years. Not only did these

forms take up excessive storage space, but often changing conditions meant that the forms would be changed. Thus the department was faced with either discarding large quantities of the form or of using a form that was not up to date. Understocking of forms meant not only the danger of running out of forms before new ones could be obtained, but also the extra expense of reproducing small quantities frequently.

As with nearly all standards, exceptions must of course be made. Uniformity is desirable, but it is not always feasible and advisable. The department administers the State tuberculosis sanatoriums and also a crippled children's hospital. Certain forms of these institutions have been made uniform, but we have found that all cannot be so because of differences in patients between the tuberculosis institutions and the crippled children's hospital. The committee is presently trying to bring about some uniformity in the patient index cards and in the social history forms used by various units in the department. The diversity of types of patients seen will prevent complete uniformity

in these forms, but a much greater similarity among them is possible and desirable.

### Summary

Since compiling and completing forms is a time-consuming activity for public health workers, having the makeup of forms as nearly faultless as possible is an efficiency essential.

A committee of top administrators in the Pennsylvania Department of Health, assisted by a procedure analyst, has reviewed all the department's forms during the past 3 years. All new or reordered forms must be approved by this committee.

Activities of the committee have brought about a marked reduction in the number of forms, an appreciable reduction in the cost of printing some of the forms, and some standardization and integration of various forms.

Department administrators have developed an increasing awareness of the relationship of records and forms to program formulation and direction in their own units and throughout the whole department.

## Radioactivity Survey in Staple Foods

A continuous survey of radioactivity in selected foods throughout the Nation has been launched by the Food and Drug Administration. Instructions inaugurating the program were issued in December 1956.

The initial goal of the program is to determine the natural "background radioactivity" in foods from different areas. These foods will then be monitored for changes in radioactivity caused by weapon testing or other uses of atomic energy.

A search is now under way for canned foods packed before 1945—"year one" of the atomic age; these products will be valuable in fixing a base for future radiation measurements. FDA is also collecting samples of recently packed foods for comparison.

Covered by the survey are 12 staple foods, including potatoes, wheat, corn, dried fruit, liquid milk, bread, and canned tomatoes. Arrangements are being made to sample imported foods as well.

*A vaccination campaign in Iran demonstrates the feasibility of smallpox eradication in foci with adverse climatic, topographic, and socioeconomic conditions. In these rugged conditions, mobile teams administered dried vaccine to the population along travel routes. The techniques can be integrated with malaria eradication work.*

## Smallpox Control by Mass Vaccination With Dried Vaccine

By HARALD FREDERIKSEN, M.D., M.P.H., D.T.M.&H.  
and JAMES P. SHEEHY, B.C.E. in S.E.

A SMALLPOX VACCINATION campaign testing the efficacy of selective mass vaccination with dried vaccine has been under way in Isfahan Province in Iran since June 1955. At that time, Isfahan was confronted by a wave of smallpox epidemics which had arisen in the northwestern provinces and was spreading southward and eastward along the major travel routes (fig. 1). It seemed that without extraordinary preventive measures massive invasion of Isfahan was only a matter of time.

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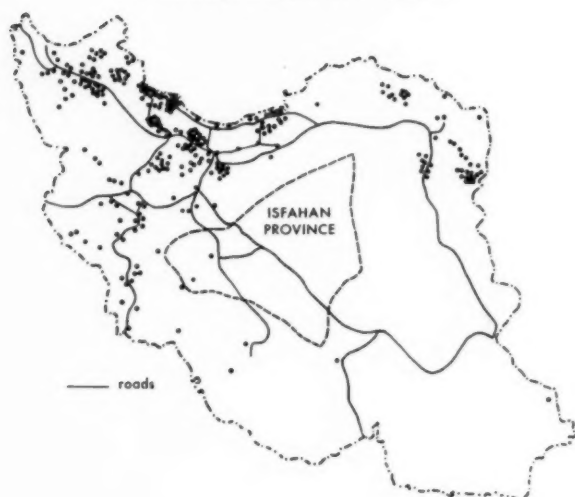
*Dr. Frederiksen, a Public Health Service officer, was assigned to the United States Operations Mission to Iran, International Cooperation Administration, Department of State, from April 1954 through June 1956. He was, in succession, co-director of the Public Health Cooperative Organization in Azerbaijan Province, co-director of the Public Health Cooperative Organization in Isfahan Province, and deputy chief of the health division of the United States mission. He is now assigned to the United States Operations Mission to Bolivia as chief of the health and sanitation division. Mr. Sheehy, also a Public Health Service officer, was assigned to the United States Operations Mission to Iran from February 1954 through May 1956. He was acting co-director of the Public Health Cooperative Organization in Isfahan Province.*

Prevention of smallpox in Isfahan is beset with many difficulties. The population is dispersed over 90,000 square miles. Of an estimated 1,300,000 population, about 750,000 live in some 2,000 villages, 350,000 in 10 urban centers, and 200,000 in migrating tribes. The eastern two-thirds of the province is largely desert, with small villages along the roads, trails, and caravan routes. The western third is traversed by the Zagros Mountains, impenetrable to vehicles in the winter and difficult of access at any time of the year. The villages in the more habitable areas are served by unsurfaced roads and trails.

Vaccination of infants and revaccination of school children and military conscripts is compulsory in Iran, but shortage of medical facilities and personnel and other factors combine to reduce the effectiveness of the law. Iran has only about 1 physician for every 10,000 persons, and most of the physicians are in the larger cities. More than 40,000 villages, comprising most of the country's 20 million population, are without permanent medical facilities or personnel. The nomadic tribes have never been reached by medical or public health programs.

In past years, the Ministry of Health of Iran has conducted the vaccination program, using itinerant or stationary vaccinators and glycer-

**Figure 1. Smallpox epidemics in Iran, January–December 1955.**



inated vaccine. Such limitations as lack of public understanding of the disease, inadequate reporting of cases, lack of isolation facilities for patients, improperly qualified and supervised vaccinators, and inadequate transportation and refrigeration facilities explain the persistence of endemic and epidemic smallpox.

When the routine vaccinations failed to check the occurrence and spread of smallpox in 1955, an anti-epidemic program was undertaken by the Public Health Cooperative Organization (a department of the Iranian Ministry of Health established with the co-operation of the United States Technical Co-operation Mission to Iran in 1953). When an epidemic was reported, the PHCO dispatched teams to vaccinate the people of the infected villages or cities and of the neighboring villages. During 1955, 3 million persons were vaccinated in the epidemic areas, but because of incomplete or delayed reporting of the outbreaks, the anti-epidemic measures were usually too late to prevent further spread of the disease.

In view of these circumstances, the PHCO decided to undertake systematic mass vaccinations in Isfahan Province, where as yet no smallpox epidemics had been reported. The campaign was designed to test the efficacy of dried vaccine under adverse field conditions and

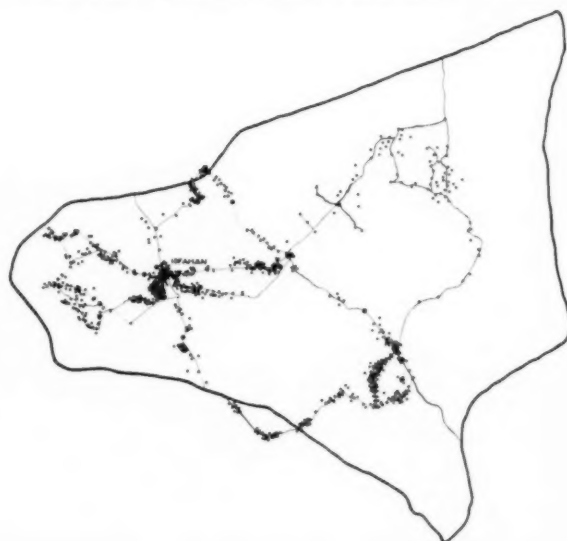
to evaluate the degree of protection afforded by mass vaccination of selected population groups. The groups were selected because of their population density, their location with reference to potential exposure, or their high mobility.

#### **Plan of the Campaign**

The first step in the mass campaign was to seal the travel routes to the spread of smallpox (fig. 2). During the summer and fall of 1955, people in all villages within about 10 kilometers of the roads and trails were vaccinated with dried vaccine. During the winter of 1955–56, the provincial capital and the nine municipalities were protected by mass vaccination with glycerinated vaccine. Glycerinated vaccine was used in the cities because of the limited supply of dried vaccine.

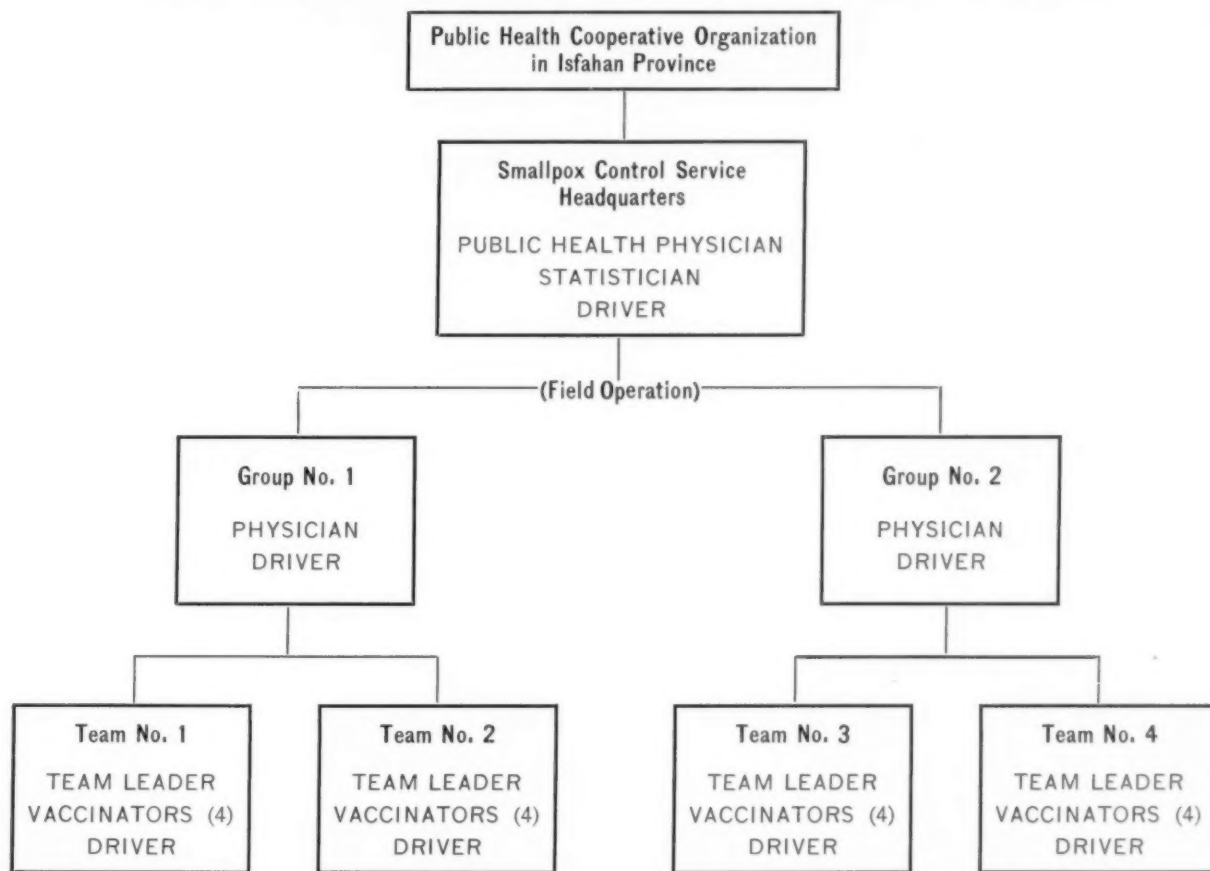
The second step was to prevent infection among the Bakhtiari tribes returning from their winter quarters in Khuzistan Province in the southwest to their summer quarters in Isfahan. During May and June 1956, more than 100,000 tribal people were vaccinated with dried vaccine as they moved through the mountain passes into Isfahan. Not only has a desired service been provided the tribes, but the spread of smallpox from Khuzistan with the mass migration has been prevented.

**Figure 2. Villages and cities vaccinated in Isfahan Province, June 1955–June 1956.**





**Figure 3. Organization of smallpox control service in Isfahan Province, Iran.**



With these measures, we believe smallpox will be little if any threat to Isfahan in the near future. The isolated and rather inaccessible villages not reached by the campaign will be kept under surveillance.

#### **Smallpox Control Service**

For the campaign, a smallpox control service was established within the Isfahan office of the PHCO. A physician was placed in charge of all administrative and technical aspects of the program. He was assisted by a clerk in tabulation of technical data, preparation of maps, and administrative routine. So that he could make frequent unannounced inspections of the field operations, the physician was provided with a jeep and driver.

In June 1955, control operations were initiated with a pilot campaign of 1 month's dura-

tion for the development of methods and training of supervisory personnel. During the pilot phase, a second physician was added to the staff to supervise the field team of four vaccinators and to inspect vaccination reactions in sample villages. The four vaccinators were formerly sanitary aides of the PHCO. After 4 weeks as vaccinators, they had demonstrated the ability to perform an adequate quantity and quality of vaccinations and were appointed supervisors of 4 teams of 4 vaccinators each. The 16 new vaccinators, formerly leaders of malaria spray teams, received theoretical and field training for 2 weeks.

The four vaccination teams were dispatched into the field about the end of July. Once the campaign was in full swing, 2 physicians were assigned to the inspection of vaccination reactions in sample villages, 1 physician to 2 teams (fig. 3).

**Table 1. Reactions to glycerinated vaccine in Tabriz, Iran, 1954**

Years since previous vaccination	Total	Primary reaction		Accelerated reaction		Immune reaction		No reaction	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent
More than 10.....	91	31	34.0	30	32.9	28	30.7	2	2.2
Less than 10.....	453	73	16.1	214	47.2	161	35.5	5	1.1

**The Village Schedule**

The physician in charge of the campaign outlined on a map the work schedule for each vaccination team. The day before a team was to vaccinate, the team leader went to the designated villages and arranged for suitable centers for the vaccinations. He also announced that vaccinations would be given the next day.

When the team arrived in a village, the team leader announced by loudspeaker that vaccinations were being given and urged the people to come. "Smallpox either kills, blinds, or disfigures, attacking young and old," he explained. "Vaccinations should be repeated; an effective vaccine is being used. Everyone should come for vaccination and should wash the left upper arm beforehand." He also supervised the mixing of the vaccine and the vaccinations, seeing that the prescribed techniques were followed. To protect the vaccine from the heat, vaccinations were done only in the early morning, 7 to 11 a. m., and in the late afternoon, 3 to 7 p. m. These hours also gave persons working in the fields an opportunity to be vaccinated.

The teams remained in the field for about 2 weeks and then returned to headquarters for 2 or 3 days of briefing and reporting. At headquarters, the vehicles received maintenance, and the teams obtained new supplies.

Each team was carried by a jeep personnel cargo carrier equipped with four-wheel drive and a battery-operated loudspeaker. The vehicles were modified to carry the team leader and the four vaccinators in addition to the driver and equipment. Supplies included folding work tables and chairs, cots, blankets, tents, and kerosene lamps, as well as vaccination kits.

**Selection of the Vaccine**

Earlier experiences in Azerbaijan Province with glycerinated vaccine had suggested the use of dried vaccine in the rural areas of Isfahan. In a mass campaign in the city of Tabriz, glycerinated vaccine, produced by the Pasteur Institute in Teheran and applied by vaccinators of the PHCO, had given takes comparable to the takes obtained with this type of vaccine at the induction centers of the United States Armed Forces in 1951 (tables 1 and 2). However, in the rural areas of the province, where the vaccine could not be kept under refrigeration, glycerinated vaccine had proved unsatisfactory. This is illustrated by events in Andab village. In the spring of 1955, the people of this village were vaccinated with glycerinated vaccine by an itinerant vaccinator. An epidemic of smallpox in the following

**Table 2. Reactions to glycerinated vaccine at induction centers of the United States Armed Forces, 1951**

Years since previous vaccination	Total	Primary reaction		Accelerated reaction		Immune reaction	
		Number	Percent	Number	Percent	Number	Percent
More than 10.....	1,297	163	12.6	727	56.0	407	31.4
Less than 10.....	760	76	10.0	343	45.1	341	44.9

SOURCE: Liao, S. J.: Responses to smallpox vaccination in military recruits. Pub. Health Rep. 70: 723-728, August 1955.



**Nomadic tribes stop at the vaccination post at Dopolan Pass in southwestern Iran.**

months affected equally those never vaccinated and those recently vaccinated (table 3).

As illustrated by the following reports, dried vaccine has a long and favorable history; yet it has been systematically produced and used on a large scale only in one country, Indonesia. Why it has not been applied widely throughout the tropics is difficult to understand.

In 1927, Otten reported that dried vaccine maintained under vacuum retains its potency at 36° C. for months and at the usual temperatures of the tropics for years (1). In a later study, by comparing the takes of 16,000 infants vaccinated on the left arm with dried vaccine and on the right arm with glycerinated vaccine, Otten found that the local reactions of the two vaccines did not differ in any respect (2).

More recently, Hornibrook and Gebhard reported that smallpox vaccine can be dried with only slight loss of potency (3). Simple equipment can be used in the drying process.

In 1955, L. H. Collier reported a study of the preservative influence of suspending media on purified vaccinia virus (4). None was effective in the liquid state, but all protected the virus against the lethal influence of freeze drying. Virus dried in 5 percent peptone still gave a full quota of successful primary reactions after storage for 12 months at 22° C. or for 4 months at 37° C. Using partially purified sheep virus dried in 5 percent peptone, Collier produced a vaccine which showed a high degree of resistance to heat, was relatively free from bacterial contamination, and was easy to reconstitute after prolonged storage.

Earlier W. A. Collier had declared that dried vaccine can be produced in practically unlimited quantities at no greater cost than that of glycerinated vaccine for the mass vaccination of populations in tropical areas (5). He pointed out that prolonged storage without loss of potency obviates the need constantly to replace lots of vaccine, as is necessary with glycer-

**Table 3. Smallpox incidence, mortality, and case fatality, among children under 7 years of age in the village of Andab, Iran, during an epidemic in 1955**

Vaccination status	Population	Number cases	Number deaths	Incidence (percent)	Mortality (percent)	Case fatality (percent)
Vaccinated <sup>1</sup>	18	9	1	50.0	5.5	11.1
Never vaccinated	33	14	3	42.4	9.1	21.4
Total	51	23	4	45.1	7.8	17.4

<sup>1</sup> Vaccinated shortly before the epidemic by itinerant vaccinators using glycerinated vaccine without refrigeration.

erinated vaccine. In 1949, the Pasteur Institute of Bandoeng, Indonesia, prepared 26 million doses of dried vaccine for the vaccination program in Indonesia.

In 1955, Baltazard, at the Pasteur Institute in Teheran, had freeze-dried calf lymph for experimental purposes. This type of dried vaccine is easily and safely reconstituted by inserting a double needle first into a vial containing glycerine and then into the vial of vaccine containing about 100 doses under vacuum. We decided to give it a trial in the rural areas of Isfahan. Confirmation of its effectiveness would permit extension of the vaccination campaign to the rest of the country.

#### Vaccination Techniques

The dried vaccine was stored in a refrigerator until issued to the field team, which received a 2 weeks' supply. In the field the vaccine was kept without refrigeration. It was not mixed with glycerine until immediately before vaccination, and then only one vial at a time. Mixing was done indoors, and, once

reconstituted, the vaccine was not removed from the room or shelter. The vial of reconstituted vaccine was placed in a fitted cloth sack which was wetted to reduce the temperature through evaporation. Any reconstituted vaccine not used in the morning was discarded, and a new vial was reconstituted in the afternoon.

Vaccinations, either with dried or glycerinated vaccine, were performed on the left upper arm at the insertion of the deltoid muscle, with a vaccinostyle. A single scratch about 4 mm. in length was made through the drop of vaccine without drawing blood. After each vaccination, the style was sterilized in the blue portion of a flame and allowed to cool. Another style was used for the next patient. For the vaccination of the nomadic tribes, disposable straight pins were used instead of vaccinostyles.

Persons with eczema or any febrile illness were not vaccinated. The patients were told not to place a bandage over the site of a vaccination.

To facilitate inspection of the vaccination, the tip of the little finger of the left hand of

**Table 4. Reactions to dried vaccine among 1,094 people in 20 villages of Isfahan Province, Iran, 1955**

Years since previous vaccination	Total	Primary reaction		Accelerated reaction		Immune or no reaction <sup>1</sup>	
		Number	Percent	Number	Percent	Number	Percent
More than 10	423	95	22.5	187	44.2	141	33.3
Less than 10	671	81	12.1	293	43.7	297	44.2

<sup>1</sup> No reaction on day of inspection, usually the 8th or 9th day after vaccination.





**A Bakhtiari child is vaccinated with dried vaccine. In the tribal vaccinations, a disposable pin was used to make the scratch.**

each person vaccinated was marked with an indelible dye.

#### **Efficacy of the Vaccine**

In a mass campaign under field conditions, it is impractical to inspect the vaccination reaction more than once. A reading on the ninth day permits the differentiation of primary and accelerated reactions, which suffices for the evaluation of the vaccine. No emphasis need be placed on the differentiation of immune reactions and no reactions, either of which may be the result of deteriorated vaccine.

The reactions among members of sample households in sample villages were inspected by a physician usually the eighth or ninth day after vaccination. The age, sex, and history of

smallpox and of previous vaccination for all members of the household were recorded, along with the size and type of reaction of those currently vaccinated.

To evaluate the efficacy of the dried vaccine, the reactions of 1,094 individuals with previous vaccination in 20 consecutive villages along the major north-south road of Isfahan were analyzed. The results, shown in table 4, compare favorably with the results obtained with glycerinated vaccine in Tabriz (table 1) and at the induction centers of the United States Armed Forces (table 2). Whereas glycerinated vaccine used under field conditions without refrigeration apparently failed to provide protection from smallpox (table 3), the dried vaccine used under such conditions gave satisfactory results.

Data from these villages also provided an estimate of the prevalence of smallpox in past years. Of 1,520 individuals in the sample households, 12.5 percent displayed the typical scars of smallpox, and almost all of these gave a history of the disease sometime during childhood. Although these individuals usually could not state either the exact year of birth or of the smallpox attack, tabulation by estimated age suggests a decline in the incidence of smallpox over the past years (table 5).

**Table 5. Number and percentage of persons with smallpox scars in 20 villages of Isfahan Province, Iran, 1955**

Age group	Number examined	Number scarred	Percent scarred
0-9	726	2	0.3
10-19	293	10	3.4
20-29	172	27	15.7
30-39	160	64	40.0
40-49	66	35	53.0
50 and over	85	50	58.8
Total	1,502	188	12.5

At the time of the mass campaign, the level of immunity in these villages was inadequate to prevent smallpox epidemics. In addition to the 12.5 percent who had had smallpox, 72.8 percent had previously been vaccinated but had not had smallpox, and 14.6 percent had had neither a previous vaccination nor smallpox. Sixty percent of those who had previously been vaccinated and 42 percent of those who had had smallpox had primary or accelerated reactions.

#### Evaluation of the Campaign

By the end of June 1956, more than 750,000 people in Isfahan had been vaccinated in the mass campaign (fig. 2). Those vaccinated included 270,354 in the provincial capital and the 9 municipalities (about 75 percent of the urban population), more than 380,000 villagers (about 50 percent of the rural population), and about 100,000 tribesmen, the latter virtually all for the first time. An average of about 250 vaccinations were done per man-day.

The campaign reached 797 villages located

near roads or trails and accessible by motor vehicle. In about half of these (359), 76 to 100 percent of the population were vaccinated on one visit of the team. In 223 villages, 51 to 75 percent were vaccinated on one visit; in 150 villages, 26 to 50 percent; and in 65 villages, 25 percent or less. The villages in which 25 percent or less were vaccinated on the first visit were visited a second time. Invariably, the villagers were more receptive on the second visit.

The number of villages in the province is unknown, but it has been estimated to be as high as 2,000. Some of these, however, comprise only a few households and others only abandoned huts. We believe that most of the villages not reached by the campaign are of little significance to the potential spread of smallpox because of their isolation.

The mass vaccination of the capital of Isfahan, with a population of about 200,000, was accomplished without the threat of a single case of smallpox in the city. Posters, films, newspaper articles, loudspeaker announcements, and leaflets dropped from the air were effective in stimulating participation. In a sample of 12,770 persons, 72 percent were vaccinated during a 3-week period. Tabulation of these individuals by age showed that 80 percent of those under 15 years, the most susceptible group, were vaccinated.

The centrifugal distribution of smallpox epidemics in Iran during the 20 months from January 1955 through August 1956 suggests that the mass campaign in Isfahan was successful in protecting the province (figs. 1 and 4). During 1955, Isfahan had only two isolated outbreaks, both preceding vaccination in those areas. The first occurred in a village of the mountainous southwest as a result of the practice of variolation with smallpox. A team of vaccinators was immediately dispatched to this village. The second outbreak occurred in the municipality of Sedeh. A sample of 1,018 individuals in that city indicated that 95 percent of the 30,000 population was subsequently vaccinated. Both outbreaks were abruptly terminated, and the infection did not spread to any other areas of the province. During the first 8 months of 1956, the only outbreak in Isfahan occurred in a nomadic tribe that had

been infected in a neighboring province. On arrival in Isfahan, the entire tribe was vaccinated, and only one case of smallpox developed after vaccination. In this case, the disease was apparently in incubation when the vaccination was done.

In the surrounding provinces, 297 epidemics were reported during 1955, and 198 were reported during the first 8 months of 1956 despite extensive peri-epidemic vaccinations with glycerinated vaccine.

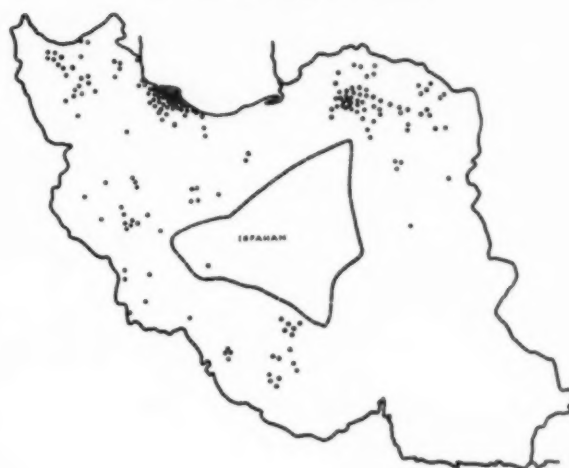
Comparison of the distribution of smallpox in 1955 with that in 1956 shows the gradual encirclement of Isfahan Province. The pincer movement of the epidemics, which arose in the northwestern province, is now threatening to close in on the southeastern province. The absence of smallpox epidemics in the southeastern province up to this time, if not the result of poor reporting, might well be attributed, at least in part, to the barriers provided by the mass vaccinations in Isfahan.

An estimate of the cost of the campaign in the rural areas is based on operations during August 1955, the month of peak activity. Operational costs for this month totaled \$3,030 and 126,229 villagers were vaccinated, an average of 2.4 cents per person. This sum covered salaries, per diem payments, expendable supplies, and maintenance and operation of vehicles, but not the depreciation of vehicles or the cost of the vaccine.

#### Integration with Malaria Control

In the summer of 1955, the mass campaign techniques applied in the province of Isfahan were modified to permit smallpox control to be combined with malaria control in the province of Azerbaijan. One vaccinator was assigned to each malaria spray team. The malaria control organization provided lines of communication and supply and supervision and transportation for the vaccinators, with consequent reductions in operational costs to about 2 cents per person. Each sprayman served as health educator for smallpox control while he was spraying a house. As far as possible, the organization and techniques developed in the campaign in Isfahan were retained, in particular the use of dried vaccine and personnel

Figure 4. Smallpox epidemics in Iran, January–August 1956.



of the PHCO, the method of vaccination, and the system of inspection of reactions.

There were 30 spray teams in the field in Azerbaijan, but a shortage of dried vaccine limited the number of vaccinators to about 15. During a period of 3 months, more than 220,000 inhabitants of 1,745 villages, with a total population of about 500,000, were vaccinated.

On the basis of this experience, we conclude that smallpox control can be effectively and economically associated with malaria control without sacrificing efficiency in either program. The association stimulated the receptiveness of the villagers toward both programs.

It is expected that in a combined smallpox-malaria program, the percentage of population protected from smallpox can be increased, with further reductions in per capita cost of vaccination. Now that an adequate supply of dried vaccine is assured, the mass vaccinations can be extended to the critical proportion of the rural inhabitants of Azerbaijan. Since spray operations are repeated each year for 4 to 5 years, there are repeated opportunities for vaccination.

#### The National Program

The Minister of Health of Iran has appointed a commission to study the problem of smallpox and to formulate a national control program. With the Isfahan campaign an apparent success, it has been decided to extend the techniques

nationwide. Similar smallpox control services are being established in all provinces, within the PHCO. Priority will be given to the mass vaccination of cities and villages along the network of major travel routes. Where feasible, the vaccination teams will be integrated with the malaria control teams. The Pasteur Institute of Teheran will produce dried vaccine in amounts sufficient for mass vaccination in rural areas. The Government of Iran (Plan Organization) has allocated vehicles and funds.

Iran hopes that this program will encourage its neighbors to participate in a collective effort to eradicate endemic smallpox from the Near East. The Pasteur Institute could provide dried vaccine for other countries at cost.

### Summary

1. Dried vaccine used without refrigeration under adverse climatic and topographic conditions proved to be a satisfactory immunizing agent in Isfahan, Iran. The percentages and types of reactions in a sample of 1,094 individuals were comparable to those obtained with glycerinated vaccine kept under refrigeration.

2. The protection of Isfahan, the central

province of Iran, from invasion by the smallpox epidemics occurring in surrounding provinces supports the concept of smallpox control by mass vaccination of population groups selected because of their density, mobility, or potential exposure.

3. The mass campaign techniques developed in Isfahan were modified to permit integration of mass vaccination with malaria spray operations in Azerbaijan. The results suggest the feasibility of integrating mass vaccination campaigns with malaria control work for the simultaneous eradication of both diseases.

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## Environment and Venereal Disease

Venereal disease is unique among the communicable infections in that it is not wholly a clinical problem. Its roots lie in the socially unacceptable environment, in social maladjustment. The venereal disease control program deals with the dilemma that is apparent, that is, the presence of a venereal disease. Our services are specific; we treat the infected individual and try to give him enough information so that he will not become reinfected or, if he does, that he will know what to do about it. However, we only skirt the edges when we look at the clinical aspects of the disease, and do not deal with the deeper social causes or remote origin of the person's present difficulties.

—C. A. SMITH, M.D., *chief of the Venereal Disease Program, Public Health Service, addressing the 1956 meeting of the Cincinnati Social Hygiene Society.*



# Psittacosis

By JOHN H. SCRUGGS, D.V.M., M.P.H.

THE DISEASE we know today as psittacosis was first described in Switzerland in 1879 as pneumotyphus. Early cases of this disease were attributed to association with parrots or parrot-like species, and the etiological agent was believed to be one of the *Salmonella* group. It was not until the pandemic of 1929-30 that the viral nature of the infection was established and the causative virus isolated and identified.

During the pandemic which started in South America in 1929 and rapidly spread to Europe and North America, the Public Health Service invoked stringent foreign quarantine regulations prohibiting the importation of psittacine birds. Few modifications have been made in these regulations during the past 25 years. Regulations controlling the interstate movement of psittacine birds were promulgated several years after the pandemic. During the late 1930's and 1940's these foreign and domestic control regulations were effective in reducing the incidence of human psittacosis in the United States to a low level of 20 to 30 cases a year.

Investigations during the period 1935 to 1950 revealed that psittacosis is a ubiquitous disease. Infection was recognized in more than 70 species of wild and domestic birds and mammals. The human case fatality rate, which had been 20 percent during the pandemic, dropped to less than 1 percent with the use of the broad spectrum antibiotics. These factors and the low number of reported human cases of the disease were considered by the board appointed by the Surgeon General of the Public Health Service in 1950 to review the Interstate Quarantine Regulations. Since the infection had been shown to be widespread in nature and of

minor importance as the cause of human morbidity, it was decided to revise the Interstate Quarantine Regulations to permit shipment of psittacine birds except into those areas where prohibited by State law. This revision in the regulations became effective late in 1951.

The lifting of the restriction on shipment resulted in an unanticipated demand for these birds, particularly parakeets, as household pets. This demand, which exceeded the available supply, activated the establishment of many backyard and basement aviaries. In a number of instances cull birds were used as breeding stock, and the husbandry practices tended to propagate rather than control disease.

The annual incidence of human psittacosis rose from 25-30 cases during the years 1945-50 to 135 in 1952, 169 in 1953, 563 in 1954, and 278 in 1955. The National Office of Vital Statistics reports that during the 23-week period January 1 to June 9, 1956, there were 205 human cases compared with 155 during the same period in 1955. The 205 cases during the first 5 months of 1956 do not include the undetermined number of cases in Oregon which were attributed to association with diseased turkeys.

The term "ornithosis" has been proposed for this infection when it occurs in species of birds other than the psittacines. In human medicine the term "psittacosis" is used to describe infections with this group of viruses without regard to the species of birds or mammals from which it may have been derived.

Although ornithosis has been recognized in chickens, human infections traced to these fowl have occurred only sporadically, and major outbreaks have not been seen. The largest outbreak in which chickens were believed to be the source occurred in 1954 in a rural area in northwestern Illinois. In this episode 37 persons became ill, and serologic evidence revealed psittacosis. No virus was isolated from any of the humans or chickens in the area.

The disease in turkeys and in humans associated with turkey processing was first recognized in Texas in 1948. Five outbreaks of psittacosis with at least 96 cases and 7 deaths occurred among employees of two Texas poultry-dressing establishments in 1948, 1951, 1952, and 1953. All the patients had been dressing turkeys for the Thanksgiving or Christmas market or at

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*Dr. Scruggs, a Public Health Service officer, is currently assigned to the New York City Department of Health as veterinary consultant. This paper was presented at the fifth annual health conference of the Pennsylvania State Health Department, University Park, Pa., August 21, 1956.*

the end of the egg-laying season. The illness varied in severity from minor influenza-like attacks to severe toxemias ending in death. In 1954, 200 cases of psittacosis were reported among persons working in turkey-processing plants in Texas, and one person died. All of these individuals had taken part in the actual processing of the birds.

A very toxic strain of psittacosis virus was recovered from turkeys in Texas in 1952 and again in 1954. Late in 1954, five human cases occurred in a small turkey-dressing establishment in New Jersey. The New Jersey virus is very similar to that seen in Texas. Epizootiological investigations have not clearly established the source of the infection in turkeys. Ecologic studies of migratory birds have given equivocal results. The virus isolated in Texas is very similar to that isolated from waterfowl on the coast of Louisiana, but a connecting link has not been established.

In September 1955, Iowa reported three human cases of psittacosis among employees of a turkey-processing plant. Serologic studies of the turkeys in this area were negative. However, too few serum specimens were tested for significant results. Serologic specimens collected from turkeys in other areas in the State were positive.

Early in 1955, a psittacosis virus strain was recovered from turkeys in Michigan. A similar strain was recognized in turkeys in California late that year. In each instance there were positive serologic findings. Pathological changes were seen in the birds at post-mortem examination, but no human cases were reported in association with these birds. Virus strains isolated from turkeys in both of these States were of low pathogenicity for mice.

The most recent outbreak of ornithosis in domestic fowl occurred in Oregon in March 1956. Infection was recognized at two turkey-breeding farms near Portland. To date some 50 to 60 human cases have been attributed to contact with these diseased turkeys. Two observations made during the Oregon outbreak which had not been seen in either the New Jersey or Texas investigations were the occurrence of cases among farm workers who had only limited contact with the live birds and the extreme infectiousness of aerosols which can be

generated during rendering plant operations. It was found that aerosols in a rendering plant which ground carcasses of diseased birds infected workmen far removed from the actual operation.

Epidemiological and epizootiological investigations of the Portland outbreak are being made. Deaths had occurred in both of these turkey flocks for several months before reaching epizootic levels. Initially, the losses were attributed to bacterial infections, and the flocks were treated with various biological and chemotherapeutic preparations. It was not until an employee on one of the farms developed psittacosis that the viral nature of the infection in the turkeys was suspected.

Ecologic and environmental studies to date have not furnished clues to the factors that either start or support an epizootic in bird populations. Virulent strains of turkey virus have been recovered in areas having widely different topographic and climatic conditions. Avirulent strains have been recovered in areas of epizootic infections. Until we have a broader understanding of the behavior of these viruses, efforts will have to be directed toward control rather than prevention of outbreaks.

Once a disease of animals moves into the human population, it assumes public health significance, and the importance of the disease is determined by the morbidity and mortality it causes, the rapidity with which it moves in a population, and the size of the group at risk. Psittacosis, once an obscure and rare disease thought to be contracted only by persons associated with parrots, has been diagnosed in people who handle other species of birds. Several species of mammals have been shown to be infected and may be the source of human infection.

Although the number of human cases of psittacosis during the period 1951-55 has shown a marked increase over the 1945-50 period, this should not cause alarm. The popularity of parakeets as household pets has resulted in a manifold increase in the number of these birds (estimated increase of from 2 to 12 million) with only a slight percentage increase in the number of cases attributed to this source. Occupational psittacosis may not be increasing but rather may be identified more often as the re-

sult of improved methods of diagnosing the disease. Public health workers and clinicians should be on the alert for occupational psittacosis because it may be an unrecognized source of respiratory illness. Current research shows

promise of feasible control measures for this disease in both parakeets and turkeys. Prevention of psittacosis in human beings depends on control of psittacosis and ornithosis in the animal population.

## Statement on the Future Need for Physicians

The changing nature of our industrial civilization, the increasing population, and the expanding knowledge revealed by research have and will continue to have a profound effect on our educational programs. It is a responsibility of the universities and of the professions to recognize and meet the needs of society. There is no area in which this obligation is greater than in the field of the health sciences.

Within the next decade, the health care of the American people based on greater knowledge through research will require increasing numbers of all types of personnel including physicians. Further, many more young men and women will be seeking higher education and training in one of the health professions.

In the 10-year period (1945-46 to 1955-56) since the end of World War II, the number of medical schools has increased from 77 to 82, the number of entering freshmen from 6,060 to 7,686, and the number of graduates from 5,655 to 6,485. Two new medical schools admitted a freshman class for the first time in the fall of 1956. At least one other school is in process of formation and will admit its first class in 1959.

Although the Association of American Medical Colleges is proud of this record of the medical schools in responding to the needs of the postwar world, it also believes that more remains to be done. Medical education should be expanded further without impairment in the high quality which has been carefully built up in the United States since 1910. It is possible that some existing schools can, with new facilities and larger facilities, accept additional students, but the need will not be met completely in this manner. The larger contribution in number of students will come,

as it has in the past, by the establishment of new schools.

On the other hand many schools have already expanded their enrollment without increase or improvement of physical plant. The 84th Congress authorized construction of research facilities, but as was pointed out by the President, this met only a part of the need to maintain the present quality of teaching for the present number of students.

The Association of American Medical Colleges urges its member institutions to survey their potentialities and capacities in the light of the future need for health personnel, and urges universities in large urban centers now without a medical school to give serious consideration to the establishment of one.

The latent period between the determination to form a medical school and service of the graduates to the people is 8 to 14 years: 2 to 4 years to plan the program, construct the buildings, and secure a faculty; 4 years for medical education; and 2 to 6 years for hospital training as an intern and resident. Hence, if we are to meet the problem, it should be borne in mind that plans made in 1956 are not for next year or the year after, but for the needs of the Nation in 1964 to 1970.

A program of expansion will require large sums of money, both for capital expenditures and for operating expense. The Association of American Medical Colleges is dedicated to the preservation of joint and coordinated support of medical education from private and government sources and believes the American people are willing and able to back ventures which will mean better health and a happier life.

*—By the Association of American Medical Colleges, adopted at the 67th annual meeting in Colorado Springs, November 1956.*



# Production of Bacterial Aerosols in a Rendering Plant Process

By J. CLIFTON SPENDLOVE, Ph.D.

**D**URING AN OUTBREAK of ornithosis in the area of Portland, Oreg., approximately 60 people were infected with the virus between February 15 and March 15, 1956. Two deaths occurred.

The source of the disease was determined to be infected turkeys from two ranches a few miles northwest of Portland. On these ranches, a large number of birds had died of unknown cause just prior to, and during, this period. The cause was later found to be ornithosis. Several hundred of these ornithosis-infected turkeys were processed by an animal-rendering plant on the northern outskirts of Portland between January 1 and March 9, 1956. During this period, part of the plant's normal staff of 18 persons became ill with what was thought to be influenza or some other nonspecific respiratory infection and more people were either hired or borrowed from a nearby plant.

A total of 32 different persons worked in the plant in the 10-week period during which the turkeys were processed. The investigation indicated that 24 employees showed symptoms of ornithosis (1). Some of these people were under hospital treatment as late as March 22, 1956. Serologic investigation revealed that 25 of 30 tested had an antibody titer against ornithosis antigen.

Dr. Samuel Osgood of the Oregon State

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*Dr. Spendlove is chief of the Agent Biology Branch, Research Directorate, Dugway Proving Ground, Dugway, Utah. His study is DPG Research Report No. 101. The study on the Andersen sampler is DPG Research Report No. 108.*

Board of Health, who inspected the rendering plant, suggested that the method of processing the animals may have created aerosols of the virus, causing the high incidence of infection.

To test this hypothesis, the board requested aid from the Biological Warfare Assessment Directory (BWAD) at Dugway Proving Ground, Dugway, Utah, in studying the rendering process and determining (a) whether the aerosols of infective organisms may be created by the processing of diseased animal tissue, and if so, (b) at which point such aerosols are heaviest, and (c) the precautions necessary to prevent a recurrence of infective aerosol production. The author was sent to Portland with the necessary equipment for making this study.

## The Rendering Process

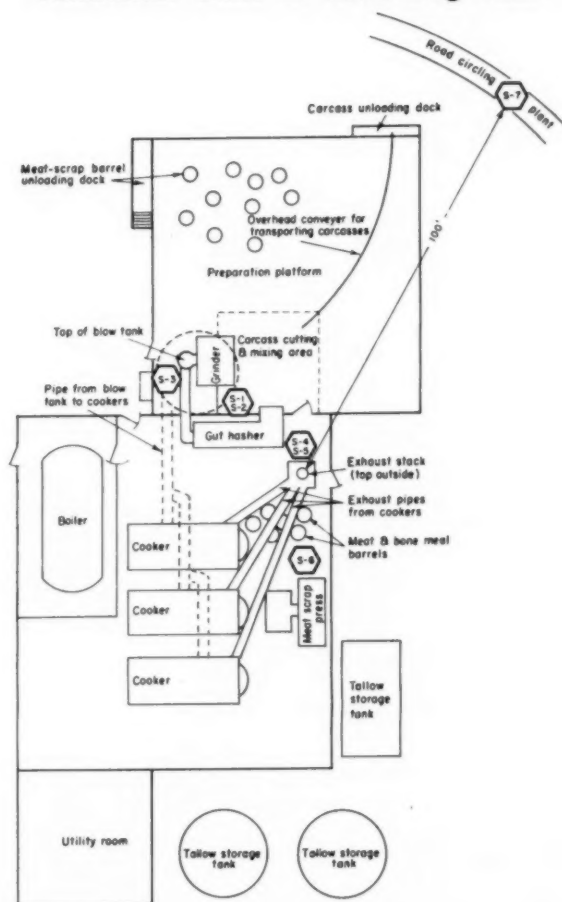
The animals to be processed are received at the west end of the building at the carcass unloading dock (see chart). The carcasses are then attached to an overhead conveyor and pulled into the building. Immediately inside the door, the animal is skinned and pulled further into the room where it is lowered to the floor and cut into pieces with a double-bitted axe. These pieces, together with other animal parts brought to the plant in barrels, are fed through a grinding machine into a "blow tank."

Offal obtained from the carcasses and from nearby meat packing plants is fed into a "gut hasher" where the animal feces are removed before these tissues are fed into the blow tank. It appeared rather obvious that aerosols of in-



testinal bacteria were being created by the gut hasher. When the blow tank is full, a small amount of steam is fed into the tank to melt some of the fat. This melted fat helps lubricate the material while it is being transferred to the cookers. The material is transferred to the cookers via a 6-inch pipe by the application of air pressure at the top of the blow tank. Air in the cookers is displaced and passes out of the

### Functional Units of Rendering Plant



⬡ indicates position of an Andersen sampler

exhaust pipes to a small stack on top of the building. During the time that most of the material is being "blown" to the cookers, the stack is steaming gently. A water washdown inside the stack, that supposedly keeps material from the blow tank and cooker from escaping into the atmosphere, contributes particulate matter to the steaming. Toward the end of the blowing process a visible water spray erupts

from the stack, probably caused by the air pressure in the exhaust pipes.

The ground material is cooked for about 1 hour at 250° F., after which the tallow is collected and placed in storage tanks at the east end of the building. The remaining cooked material is then placed in a press which extracts most of the remaining tallow and dries the resulting meat and bone meal. This meal, which resembles furnace ashes and clinkers, is then placed in open barrels and transported to feed or fertilizer processing plants.

### Materials and Methods

#### *Tracer Bacteria*

To determine the production of aerosols by the rendering process, chromogenic bacterial slurries (*Bacillus globigii* and *Serratia marcescens*) were prepared and painted on carcasses or sprinkled on the material in barrels before processing began. These two tracer organisms were chosen not only because of their pigment production but also because *S. marcescens* is a vegetative form, showing little resistance to heat and drying by aerolization, while *B. globigii* is a spore-forming organism more resistant to heat and drying.

A total of 4 trials were conducted: two *S. marcescens* trials using approximately 2 quarts of slurry containing  $10^{10}$  organisms per milliliter and 2 *B. globigii* trials using approximately 2 quarts of slurry containing  $10^6$  organisms per milliliter.

#### *Sampling Procedures*

Aerosol production was determined with the standard Andersen sampler, essentially a cascading sieve sampler which separates the particles of an aerosol into various size ranges and permits culturing for easy counting of colonies developing from viable organisms. The samplers were operated with a flow rate of 1 cubic foot per minute.

Seven samplers were used in each trial in locations within and outside the plant. These samplers were timed to operate during various phases of the rendering process as indicated in table 1.

Table 1. Sampler location and length of sampling interval

Sampler No.	Sampler location <sup>1</sup>	Sampling began	Sampling ended	Approximate operating time (minutes)
S-1-----	Between grinder and gut hasher	After application of tracer organisms to the animal material	5 minutes later (before beginning of grinder operation)	5
S-2-----	Between grinder and gut hasher	At the beginning of the grinding operation	At the end of the grinding operation	35-45
S-3-----	Near top of blow tank----	At the beginning of the grinding operation	At the end of the grinding operation	35-45
S-4-----	Near top of exhaust stack	At the beginning of the steaming from the exhaust stack	Just before water-spray eruption from exhaust stack	5-20
S-5-----	Near top of exhaust stack	At the beginning of the water-spray eruption	5 to 10 minutes after the end of the water-spray eruption	5-10
S-6-----	Between cooker and meat-scrap press	Trial 1: At the beginning of the cooking operation Trials 2, 3, and 4: At the beginning of the pressing operation of the preceding run	60 minutes later----- At the midpoint of the following cooking operation	60 30-60
S-7-----	Approximately 100 feet downwind from exhaust stack	At the beginning of the steaming of the exhaust stack	At the end of the water-spray eruption	10-25

<sup>1</sup> Field control, taken to determine whether the method of applying the tracer organisms created an aerosol. Limitations of time and equipment precluded the taking of field controls at other points in the plant.

#### Culturing Procedures

Air samples were collected on nutrient agar which had a pH of 6.5 and was enriched with 1.0 percent glucose and 0.5 percent starch. The enrichments in the nutrient agar enhanced the pigment formation by the tracer organisms. The plates from the *S. marcescens* trials were incubated for 48 hours at 26° C., while those from the *B. globigii* trials were incubated for 48 hours at 37° C. The lower temperature for the *S. marcescens* is necessary for that organism's developing maximum pigment formation.

#### Results

The four trials were completed during one 8-hour-day operation at the rendering plant. The two *S. marcescens* trials were conducted first but were not completely successful because other microbial forms, probably intestinal bacteria together with molds and yeasts, crowded out the *S. marcescens*. However, some *S. marcescens* were recovered at all seven sampling positions, with the highest discernible counts in the vicinity of the grinder. These data are not presented here because the mask-

ing effect of overgrowth by other forms precluded any accurate counts. During the *B. globigii* trials, a large number of *S. marcescens* were collected, perhaps from residual agent left in the grinder since the control count before the trial was low. Overgrowth of other forms was not so extensive in the *B. globigii* trials, probably because of the higher incubation temperature. Data from both *B. globigii* trials are presented in tables 2 and 3.

#### Discussion

As expected, the highest counts were obtained in the area of the grinder and blow tank, which, together with the gut hasher, are undoubtedly the foci of heavy aerosols arising from the processing of animal tissue. The fact that *S. marcescens* survived from its first application through the *B. globigii* trials indicates that little in the initial phases of the rendering process is detrimental to vegetative forms and, therefore, that these initial phases were probably not any more harmful to the ornithosis virus. Since infected birds or mammals probably contain many times more infective organ-

isms than the number of tracer organisms used in any one trial in this investigation and since most or all of the turkeys processed in the rendering plant were probably infected with ornithosis, the aerosols of this organism were most likely extremely heavy on the days the turkeys were processed. Such an assumption would account for the high incidence of infection in plant personnel.

The cookers should destroy all pathogenic forms because of the extended time that the

material is subjected to high temperatures; therefore, a fine dust arising from the meat and bone meal press was probably sterile. This theory was confirmed, somewhat, by the fact that sterile dust was collected on the sixth stage of sampler S-6 placed in the cooker room.

The relatively high number of *S. marcescens* collected, as compared to *B. globigii*, was probably due to the wide difference in the initial slurry counts,  $10^{10}$  and  $10^6$  organisms per milliliter, respectively.

**Table 2. Recovery of *Bacillus globigii* (BG) and *Serratia marcescens* (SM) from aerosols created by processing animal carcasses painted with bacterial slurry through a rendering plant—trial 3**

Sampler No.	Position	Organism sampled	Total number organisms recovered	Air sampled, cubic feet	Organisms per cubic foot of air sampled
S-1	Control <sup>1</sup>	BG	4	8	0.5
S-1	do	SM	4	8	.5
S-2	Grinder	BG	Sample lost		
S-2	do	SM	do		
S-3	Blow tank	BG	24	35	.69
S-3	do	SM	446	35	12.74
S-4	Stack (steaming)	BG	0	5	0
S-4	do	SM	0	5	0
S-5	Stack (blowing)	BG	10	5	2.00
S-5	do	SM	2	5	.40
S-6	Cooker	BG	48	40	1.20
S-6	do	SM	191	40	4.78
S-7	Downwind	BG	3	10	.33
S-7	do	SM	5	10	.50

<sup>1</sup> The control sampled only the background in the vicinity of the grinder and blow tank after the slurry was painted on the animal carcasses.

**Table 3. Recovery of *Bacillus globigii* (BG) and *Serratia marcescens* (SM) from aerosols created by processing animal carcasses painted with bacterial slurry through a rendering plant—trial 4**

Sampler No.	Position	Organism sampled	Total number organisms recovered	Cubic feet of air sampled	Organisms per cubic foot of air sampled
S-1	Control <sup>1</sup>	BG	Sample lost		
S-1	do	SM	do		
S-2	Grinder	BG	193	45	4.29
S-2	do	SM	498	45	11.67
S-3	Blow tank	BG	59	45	1.31
S-3	do	SM	229	45	5.09
S-4	Stack (steaming)	BG	11	20	.55
S-4	do	SM	10	20	.50
S-5	Stack (blowing)	BG	24	10	2.40
S-5	do	SM	9	10	.90
S-6	Cooker	BG	9	30	.30
S-6	do	SM	31	30	1.03
S-7	Downwind	BG	5	15	.33
S-7	do	SM	3	15	.20

<sup>1</sup> The control sampled only the background in the vicinity of the grinder and blow tank after the slurry was painted on the animal carcasses.

The data presented herein are little more than qualitative in nature because of the interference from other microbial forms also present as aerosols, and because of the fact that no determination could be made as to whether the aerosol collected was homogeneous throughout the sampling period or whether the concentration varied considerably with time. In any future investigations the homogeneity of the aerosol could be determined with slit samplers.

When it was recommended that all material be heated before it was processed, the plant manager stated that this process would ruin the hides. The hides apparently represent a rather larger proportion of the profit from an operation of this type. The author recommended that, in lieu of initial heating, the material be heated by steam under pressure immediately after the skinning operation and before it is processed through either the grinder or the gut hasher. It was also recommended that the gut hasher and grinder be covered or in some way redesigned to minimize aerosol production.

Since the tracer organisms used in these trials are not found naturally in the atmosphere, organisms recovered from the stack and at a position downwind from the stack must have come from the plant. This being true, the processing of diseased animal tissues by this type of rendering plant represents a hazard to people in surrounding areas, as well as to the normal working staff of the plant. Some of the animals processed might have died of any one of a number of animal diseases that may infect man. These include besides ornithosis: anthrax, brucellosis, tularemia, glanders, sylvatic plague, Q fever, and virus equine

encephalitis. A study of the antibody titer to these diseases in rendering-plant personnel and nearby permanent residents should be of interest to many health departments since aerosols of such infective organisms may represent a potential hazard to almost every community of any size in America.

### Conclusions and Recommendations

From the study of the aerosol production in an animal rendering plant, the following conclusions have been drawn:

1. The rendering process does create aerosols;
2. The heaviest concentration of aerosols appears to be in the vicinity of the grinder and the gut hasher;
3. Vegetative organisms persist in the grinder and gut hasher after these machines have been initially inoculated;
4. Both vegetative and spore-forming organisms survive the blowing operation and are released into the atmosphere; and
5. Both vegetative and spore-forming organisms can be recovered 100 feet downwind from the exhaust stack.

From the conclusions of this study, it is recommended that:

1. All animal material other than hides be heated prior to processing; and
2. Plant machinery be redesigned to minimize aerosol production.

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## Symposium on Venereal Disease

The eighth annual symposium on Recent Advances in the Study of Venereal Diseases will be held in the auditorium of the Department of Health, Education, and Welfare, Washington, D. C., on April 24-25, 1957. The sessions are open to all interested physicians and workers in allied professions.



## International Conference On Traffic Accidents

**M**OTOR VEHICLE ACCIDENTS as Canada's "third cause of death," out-ranked only by heart disease and cancer in "lost life expectancy," occupied the first major international conference on medical aspects of traffic accidents, organized principally by Dr. Harold Elliot, chairman of the department of neurology and neurosurgery at Montreal General Hospital in Canada.

The conference was called in Montreal, May 4 and 5, 1955, to determine the medical problem and the responsibility of the medical profession, to assess current relevant data, and to indicate areas for research.

More than 90 papers were presented by Canadian, American, and British representatives of the medical professions, traffic engineering, motor vehicle control, voluntary safety associations, education, and industry.

Interest among Canadians was heightened by the fact that the traffic accident death rate almost doubled in their country between 1944 and 1953.

Canadian traffic deaths per 100 million miles driven fell off roughly 40 percent between 1929 and 1953, but deaths per 100,000 population increased more than 60 percent, illustrating the misleading nature of the former type of criteria. Although the British traffic death rate appears to be only about half the American and Canadian rates (which are now very similar), Dr. G. F. Rowbotham, of Newcastle-upon-Tyne, stated flatly that "no improvement can be regarded as valid until the figures, 5,000 dead and 50,000 seriously injured, are substantially lowered."

Driver education, for adults as well as in the schools and colleges, was recognized as an essential element in any serious effort to minimize traffic accidents.

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A second unanimous conclusion by the participants in the conference was the need for greatly expanded research programs, both public and private, to develop further data on the medical aspects of highway safety.

A panel concerned with children and traffic accidents recommended that medical groups exercise leadership in research, that pediatricians aid in the safety education of preschool children, and that medical schools emphasize the magnitude of the accident problem in their instruction of students. Dr. George M. Wheatley, vice president of the Metropolitan Life Insurance Co., concluded: "When the physician speaks, people listen. . . . Are you using your influence to attack this challenging public health problem?"

A panel on traffic accidents in industry stressed the contribution that can be made to highway safety by employee health programs, including periodic physical examinations and the early detection of disease. The "important responsibility" of both industry and industrial medicine in this area of accident prevention was emphasized.

A wealth of specific material on automotive crash injury research was presented by John O. Moore and Edward R. Dye of Cornell University and by D. M. Severy, J. H. Mathewson, and Dr. C. O. Bechtol of the University of California (in cooperation with the Yale Medical School). The report of the Cornell Auto Crash Injury Research Project indicated that the frequency with which doors open during impact and the resultant ejection of occupants are the most prominent factors observed as associated with the causation of injury in automobile accidents. The Canadian Engineering Committee of the National Highway Safety Conference (May 1955) recommended that greater emphasis be given to safety considerations in the design of vehicles. They stated that subordination of safety features for the sake of appearance and economy should not be condoned.

The relationship of alcohol and traffic accidents was analyzed in several papers and discussed at some length. Although there was agreement that the drunken driver is a menace (Dr. B. B. Coldwell of the Royal Canadian Mounted Police estimated that alcohol contributed to 25 percent of fatal road accidents),

there was difference of opinion concerning the validity of current chemical tests of intoxication. Dr. I. M. Rabinowitch, consultant in the department of metabolism and toxicology, Montreal General Hospital, questioned the assumption that all persons are intoxicated when they have 0.15 percent of alcohol in their blood, and asserted that chemical tests of intoxication "are being used improperly in a very large percentage of cases" and thus "do not serve the ends of justice."

The panel considering neurological disorders concluded that some persons with a history of epilepsy are capable of driving but that a seizure free period of 2 years might be considered the minimum requirement before a patient should be regarded as competent to drive. Further study of this problem was recommended.

Dr. Alan Canty reported on the experience of the Psychopathic Clinic in Detroit and presented data comparing the diagnoses of 812 traffic offenders with an equal number of convicted criminals in 1953; "mental deficiency" was found in 30 percent of the traffic offenders, for example, but in only 13 percent of the convicted criminals. Dr. Leon Brody reported on the New Jersey Accident Prevention Clinic. The panel on behavior defects as a cause of accidents recommended that Canada follow the Detroit and New Jersey example in establishing clinics for the examination of traffic offenders.

There was detailed discussion of the need for adequate and uniform examinations of vision by agencies licensing drivers. It was recommended that a special examination be made "by a competent ophthalmologist at the slightest indication of the presence of organic or functional defect or abnormality in eyes of an applicant for a driver's license." Visual fields, ocular muscle balance, color vision, night vision, and highway design and illumination were topics treated by several speakers.

In discussion of emergency care, papers were presented on ambulance organization, first aid equipment, management of acute spinal

injury, acute head injuries, and anesthesia. It was recommended that first aid courses be taught in medical schools, that cities be zoned for ambulance organization, and that station wagons containing stretchers be substituted for traffic police cars. The need for sirens on ambulances was questioned.

Dr. A. F. Fowler of McGill University said that it is his impression "that diabetics are one of the safest groups of drivers on the highway regardless of whether they do or do not take insulin." Other speakers noted that paraplegic drivers compare favorably with normal drivers.

Donald Slutz, managing director of the Traffic Safety Association of Detroit, illustrated the value of community organization for traffic safety from the experience of his city. Comparing a 13-year period following the start of the Detroit community campaign for safety (1941-53) with a previous period (1926-38), Slutz stated that, while Detroit motor vehicle registration increased 66 percent, traffic fatalities decreased 40 percent. Strict enforcement of regulations was combined with a widespread and continuing educational campaign. Although acknowledging that the great majority of our drivers are good citizens who make a sincere effort to drive lawfully and courteously, Slutz asserted "there are not many competent drivers in these United States."

Full proceedings of the conference have been published in a 519-page volume through the courtesy of the Sun Life Assurance Co. of Canada. The general areas covered are statistical data; preschool and school children in traffic accidents; traffic accidents in industry; autocrash injury research; alcohol and traffic accidents; neurological disorders and driving; behavior defects as a cause of traffic accidents; ocular implication of traffic accidents; emergency care, first aid, and ambulance services; screening clinics and physical ailments; and community organization and education. A bibliography and indexes are included.

*In Colorado Springs, Colo., where the water supply naturally contains an excessive amount of fluoride, the recommendation to provide children with bottled water almost free of fluoride during development of the permanent teeth has produced measurable reduction of fluorosis, but few parents have followed the recommendation.*

## Experience in Preventing Dental Fluorosis By Using Low-Fluoride Bottled Water

By NORMAN F. GERRIE, D.D.S., M.P.H., and  
FLORENCE KEHR, M.A.

THE RELATIONSHIP between fluoride and dental health was first discovered in 1931. At that time it was learned that children with dental fluorosis had been born and reared in areas where excessive quantities of fluoride were present naturally in water supplies (1,2). Subsequent epidemiological studies (3-6) and animal investigations (7,8) have demonstrated an inverse relationship between the consumption of fluoride-bearing water and the prevalence of dental caries.

The optimal level of fluoride in drinking water is about 1.0 p.p.m. F, with a slight adjustment permitted above or below that point for temperature. This level is effective in preventing dental caries and, at the same time, constitutes the threshold for dental fluorosis (9). When the fluoride level of the drinking water exceeds the threshold, dental fluorosis makes its appearance, beginning with inconspicuous man-

ifestations. There is a proportionate increase in the percentage of the population affected by dental fluorosis and in the severity of the condition as the fluoride level increases beyond the threshold. In its milder forms, dental fluorosis is objectionable only because of the cosmetic effect, but when the fluoride level of a community water supply is high enough to produce the more severe forms, preventive measures are indicated.

The work of early investigators, in associating dental fluorosis with ingestion of high-fluoride water during the development of the permanent teeth, has shown that the disease can be prevented by consumption of water of low-fluoride content during the first 8 years of life (1,2). In an effort to apply this knowledge constructively, dentists and pediatricians of Colorado Springs, Colo., a community with a water supply high in fluoride and with a correspondingly high prevalence of dental fluorosis, have recommended since 1935 that parents provide their children with low-fluoride water during the development of the permanent teeth as a preventive measure against this disease. The local dairies have cooperated by supplying low-fluoride (0.2 p.p.m. F) bottled water from their private wells, delivering it to the homes

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with the milk. Many families have purchased this water.

To evaluate voluntary use of low-fluoride water as a measure to prevent dental fluorosis, a study of the city's 13- and 14-year-old children was conducted. First, we investigated the extent to which the bottled water had been used. Second, we compared the prevalence of fluorosis and of dental caries in children who had consumed the bottled water with the prevalence in children who had consumed only the city water.

Colorado Springs was the scene of previous studies by Dean (4,10) on the relationship of waterborne fluorides to dental fluorosis and dental caries, and by Russell (6) on the relationship to dental caries and periodontal disease. The city possesses the following requisites for quantitative evaluation (5) of the effects of ingestion of high-fluoride water:

1. The fluoride content (2.6 p.p.m. F) of the communal water supply is sufficient to cause dental fluorosis in a high percentage of continuous residents (4).

2. The history of the water supply discloses no relevant changes in its physical setup, source, or composition during the past 75 years. (Before initiating the study, a careful check was made of the water supply since 1935.)

#### Study Method and Procedures

The study information was collected during October 1953. The children selected for investigation included all available 13- and 14-year-old white children who were born in Colorado Springs, who had resided in areas served by the city water supply system, and who had not been away from the city for more than 30 days in any 1 year during the first 8 years of life.

The children were subjected to a strict screening procedure to exclude from the study any whose residence and water histories did not conform to the requirements. Four separate checks were made. First, a questionnaire was sent to the parents, requesting information on all absences of the children from the city during their first 8 years and on the source of water consumed by the family. Second, another questionnaire was sent to the parents of chil-

dren classified as eligible from answers to the first. This inquired into possible family residence in suburban areas not on the main city water system. Verification of the residence and water histories was obtained by oral questioning of the mothers during home interviews, and a final check was made at the time of the dental examination by oral questioning of the children.

During the home interviews, the mothers were questioned with respect to the early dietary of their children, particularly the use of bottled water and the period of its consumption. Information was secured on the water used in preparing formula and on the supplementary water customarily offered to the child between feedings, but not on the water used for cooking food eaten by the children.

Dental examinations were made by a dentist using mouth mirror, No. 5 double end explorer, and portable operating light. Data were recorded on degree of fluorosis and on dental caries in all permanent teeth except third molars. Fluorosis was classified as very mild, mild, moderate, or severe. Since it was anticipated that much of the caries would be located in pits and fissures, the criteria for diagnosis of beginning caries in those locations were established as (a) penetration of the pit or fissure by the explorer tip, (b) the explorer to remain in place without pressure, and (c) the explorer to resist withdrawal. No areas in which the explorer caught were counted as carious in the absence of the objective signs of opacity or penetration of softened tooth structure.

Subsequent to the dental examinations and the collection of data on residence and water consumption, the children were divided into a study group composed of children who had consumed bottled water and a control group composed of those who had used only the high-fluoride city water. The periods during which bottled water had been used ranged from as little as a week to as long as an entire lifetime. This presented a problem: The inclusion of children who had consumed the bottled water for only a few weeks would dilute the study group with virtual counterparts of the control group. The inclusion of only those children who had consumed the bottled water for the full 8 years of tooth development, which would



**Table 1. Prevalence of fluorosis among 13- and 14-year-old children, according to source of water consumed, Colorado Springs, Colo.**

Group and age	Number of children examined	Children with fluorosis	
		Number	Percent
Group I (bottled water) <sup>1</sup>	56	21	37.5
13-----	38	13	34.2
14-----	18	8	44.4
Group II (city water) <sup>2</sup>	120	82	68.3
13-----	71	47	66.2
14-----	49	35	71.4

<sup>1</sup> All children received bottled water containing 0.2 p.p.m. F for a minimum period of the first year of life; some received it for longer periods of time, ranging up to 14 years. <sup>2</sup> All children consumed city water containing 2.6 p.p.m. F throughout their lives.

be desirable from the standpoint of determining the effect of ingestion of low-fluoride water on fluorosis and dental caries prevalence, would not give a study group large enough to warrant serious conclusions. It was decided to set as the requirement for the study group the consistent use of bottled water (in formula and as supplementary water) during at least the first year of life. This requirement gave a study group of usable, although less than desirable, size. The first year of life was considered to be the most reliable continuous period during which bottled water was consumed.

Qualifying for admission to either the study group or the control group were 176 children. The study group (group I) was composed of 56 children who had consumed the bottled water for 1 year to 14 years. Twenty percent of these

children had consumed the bottled water for as long as 4 years. The control group (group II) was composed of 120 children who had consumed only city water.

### Fluorosis and Dental Caries

Table 1 presents the findings with respect to prevalence of dental fluorosis in groups I and II. Of the 56 children who had received bottled water, 37.5 percent had fluorosis. Of 120 children who had ingested city water, some evidence of the condition was found in 68.3 percent. The findings were consistent for both 13- and 14-year-old children in both groups.

In addition to the percentage of children with fluorosis, the dental fluorosis index (5), which describes the degree of clinical severity of the disease, was computed for each group. The index employs a formula in which a weighted value is assigned to each degree of fluorosis. It therefore provides a more meaningful epidemiological picture of the relative intensity of fluorosis prevalence in a group than may be obtained by simple numerical count of those affected. The index range of 0.0 to 4.0 affords classification of the significance of fluorosis in a community from "negative" to "very marked," with intermediate degrees of "borderline" (0.4-0.6), "slight" (0.6-1.0), "medium" (1.0-2.0), and "marked" (2.0-3.0). An index of 0.6 or greater indicates a problem of public health concern.

The dental fluorosis index of group I was 0.75 as compared with an index of 1.17 for group II. In 1940, Dean (4) reported a dental fluorosis

**Table 2. Prevalence of dental caries among 13- and 14-year-old children, according to source of water consumed, Colorado Springs, Colo.**

Group and age	Number of children examined	Caries-free children		Number of DMF teeth	Number of DMF teeth per child
		Number	Percent		
Group I (bottled water) <sup>1</sup>	56	30	53.6	79	1.41
13-----	38	18	47.4	54	1.42
14-----	18	12	66.7	25	1.39
Group II (city water) <sup>2</sup>	120	58	48.3	214	1.78
13-----	71	37	52.1	100	1.41
14-----	49	21	42.9	114	2.33

<sup>1</sup> All children received bottled water containing 0.2 p.p.m. F for a minimum period of the first year of life; some received it for longer periods of time, ranging up to 14 years.

<sup>2</sup> All children consumed city water containing 2.6 p.p.m. F throughout their lives.

index of 1.3 for 404 native white 12-, 13-, and 14-year-old children in Colorado Springs, an index slightly higher than the index of group II. Both 1.17 and 1.3 are classified as of "medium" significance.

The 11 children (20 percent) in group I who had consumed the bottled water for 4 years or more had a fluorosis index of 0.50. The remaining 45 children (80 percent) who had used this water for at least 1 year but for less than 4 years had a fluorosis index of 0.84.

The dental caries experience of the two groups is shown in table 2. About half the children in each group were caries free. The DMF rate for the group which had used bottled water was slightly lower than the DMF rate for the group which had used city water, 1.41 as compared with 1.78 DMF teeth per child. The difference, however, is not statistically significant.

### Discussion

Although the mothers appeared to experience little difficulty in recalling, 13 to 14 years later, details of their children's dietaries, such as formula preparation, source of supplementary water, and length of time on bottled water, it is recognized that there is possibility of errors of memory. This was more probable when there were several children in the family. This circumstance must be kept in mind in evaluating the observations presented here.

It is possible that some, if not all, children in group I while on bottled water concurrently received variable amounts of city water through eating foods cooked in tap water or when the bottled supply was temporarily exhausted. It is likely, also, that as the children grew older, an increasing amount of city water was consumed from various sources outside the home, particularly after admission to school at age 6, and certainly by those for whom the provision of bottled water was discontinued. This would cause the fluoride intake of group I to approach that of group II, thus tending to obscure the effects of the variable under consideration. It is impossible to know with exactness the extent to which the city water was consumed by group I; however, these children revealed a fluorosis experience equivalent to that which is

known to result from consumption of water with an average fluoride content of about 1.5 p.p.m. during the development of the permanent teeth (11).

Among the children who consumed low-fluoride bottled water for periods ranging from 1 to 14 years, 37.5 percent developed fluorosis. In contrast, among the children who consumed high-fluoride city water throughout their lives, 68.3 percent developed fluorosis. If the percentage of fluorosis found in the latter group is considered to represent normal fluorosis expectancy in this city, and if the same proportion had prevailed in the group on bottled water, 38 children with fluorosis might have been expected instead of 21, a difference of 45 percent.

The recommendation by pediatricians and dentists in Colorado Springs that children receive low-fluoride water to prevent dental fluorosis has resulted in measurable benefit. The prevalence of fluorosis in children for whom this practice was followed for a year or longer was only half that observed in children who remained on the high-fluoride city water. The greater percentage of individuals without fluorosis among the children who had received the bottled water shows a definite correlation with ingestion of this water.

Nevertheless, the study indicates that this recommendation has not been practiced widely and consistently. Relatively few parents had ever provided bottled water for their children, and very few had provided it during the full 8 years essential for prevention of fluorosis. Of the 176 children studied, less than one-third (56) had received bottled water for as long as 1 year, and only 20 percent of these had consumed it for more than 4 years.

The fluorosis index of the children on bottled water (0.75) falls in the objectionable range; about one-third of them had an undesirable degree of fluorosis. It is possible that the recommendation might have been more successful in achieving its objective if it had been more strongly brought to the attention of parents through a variety of sustained educational measures. Of interest in this respect was the observation that several children were still consuming bottled water at 14 years of age, indi-

cating that their parents did not understand that it could be discontinued at age 8.

In view of the inadequate results obtained by voluntary use of low-fluoride bottled water, defluoridation of the city water supply to an optimal fluoride level might be considered as an alternative preventive measure. Defluoridation would benefit the total child population, in contrast to the existing practice which benefits only the few children who are given the bottled water consistently for the required number of years. Furthermore, defluoridation would obviate the possibility of children ingesting an excessive amount of fluoride from foods cooked in city water and from other sources. This is a likely circumstance as has been pointed out. The cost of defluoridation constitutes a deterring but not insuperable obstacle to employment of this measure.

The children on bottled water were not more susceptible to caries than the children on city water, an eventuality which might be expected to result from inadequate fluoride intake. On the contrary, the ingestion of bottled water apparently had no effect on the percentage of children immune to caries at the age levels studied. This suggests that the children on bottled water received, at a time critical to the development of caries-inhibiting factors, enough city water from various undetermined sources to produce the same degree of caries immunity as among the children on city water. Furthermore, they had a caries rate as low as that of the children who had ingested the city water. These observations indicate that the group I children had received an amount of fluoride of near-optimal level (11) with respect to caries prevention.

The caries rates of both groups were extremely low, even when compared with caries rates in other communities with high-fluoride water supplies. In part, this may be accounted for by the examination criteria employed, which described as carious only those pits and fissures which exhibited objective signs of caries.

### Summary

In 1953, a study was undertaken in Colorado Springs, Colo., to learn what success in pre-

venting dental fluorosis had been achieved by the practice of recommending that children be given low-fluoride water during the development of their permanent teeth. For the past 75 years, the water supply of this city has contained about 2.6 p.p.m. F, and the prevalence of dental fluorosis in continuous residents has been high. Since 1935, bottled water containing 0.2 p.p.m. F has been available from the local dairies.

All available 13- and 14-year-old children who were lifetime residents of the city were the study subjects. From information obtained in home interviews with mothers of the children, it was learned that only 56 children had consumed bottled water for as long as the first year of life, as compared with 120 who had consumed only city water. The period of use of bottled water ranged up to 14 years, but only 20 percent of the 56 children had consumed the bottled water 4 years or longer. Several children were still on bottled water at the age of 14, indicating that their mothers did not understand that it could be discontinued at age 8.

Data from dental examinations provided the following observations:

1. Of the children on city water, 68.3 percent developed fluorosis. Of those using bottled water for varying periods of time, only 37.5 percent exhibited fluorosis. The lower percentage in the latter group may be attributed to the use of the bottled water.

2. Many of the children who used the bottled water still demonstrated objectional fluorosis, probably due to irregular use of this water. The fluorosis index for the group on bottled water was 0.75.

3. About 50 percent of each group of children were free of dental caries, and there was no substantial difference in the DMF rate between the two groups.

From these observations, it is concluded that the practice of recommending the use of low-fluoride water has resulted in a reduction in the prevalence of fluorosis and that it has not adversely affected the prevalence of caries. However, defluoridation of the city water supply to 1.0 p.p.m. F would seem to be a more effective means of preventing fluorosis. At the same time, it would assure consumption of water containing an optimum level of flu-



oride for prevention of dental caries by all children in the community.

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### Trial Interviews for the National Health Survey

A pilot test study under the new National Health Survey program of the Public Health Service was initiated on January 28, 1957, in Charlotte, N. C. The action is designed to test several aspects of a questionnaire intended for nationwide use.

Basic data collected by interviewers from a sample of households in the metropolitan area of the city will include the number, age, sex, and other characteristics of persons with diseases, injuries, or handicapping conditions. Questions also concern medical care, the length of time afflicted persons are unable to pursue their normal activities, and the economic and other effects of their incapacity. The Charlotte study will also serve as a trial for field administration techniques.

Performance of this advance test and other field work on the survey has been assigned to the Bureau of the Census.

Legislation enacted by Congress last summer authorized the Surgeon General of the Public Health Service to set up continuing annual surveys and special studies on illness and disability in the Nation.